Physical and Technical

Table (continued)

Физико-технические величины												
(12) Коэффициент Пуассона μ	(13) Модуль сдвига $G \cdot 10^{-4}$ (в кг/см²)	(14) Модуль упругости $E \cdot 10^{-4}$ (в кг/см²)	(15) Механическая прочность $\sigma_{сж}$ (в кг/см²)	(16) Количество тепловых ударов до разрушения	(17) Электрическая прочность	(18) Диэлектрическая потери $tg\delta$	(19) Температурный коэффициент диэлектрической проницаемости $(\varepsilon \cdot 10^6)$					
0.21	0.47	1.14	320	<25	7.1	$5 \cdot 10^{-2}$	+58					
0.22	1.87	4.57	1530	<25	8.7	$5.8 \cdot 10^{-2}$	+150					
0.19	0.97	2.00	540	<25	10	$2.7 \cdot 10^{-3}$	+100					
0.22	1.17	2.85	795	<25	14.2	$2.8 \cdot 10^{-3}$	+74					
0.26	1.85	4.60	1000	<25	11.9	$1.7 \cdot 10^{-3}$	+19					
0.26	2.40	6.05	605	11	14.7	$1.0 \cdot 10^{-3}$	+50					
0.22	1.50	3.71	575	<25	6.7	$5.0 \cdot 10^{-3}$	+1230					
0.26	2.84	7.13		<25	7.7	$4.4 \cdot 10^{-3}$	+1220					
0.25	1.56	3.93		<25	9	$4.7 \cdot 10^{-3}$	+775					
0.29	2.38	6.17		<25	11	$5.0 \cdot 10^{-3}$	+7601					

Card 6/6

15.2420
21,2110

S/080/61/034/008/010/018
D204/D305

AUTHORS: Keler, E.K., Godina, N.A. and Degen, M.G.

TITLE: Electron microscopic and thermographic study of solid-phase reactions in the systems HfO_2 - BaO, HfO_2 - SrO and HfO_2 - CaO

PERIODICAL: Zhurnal prikladnoy khimii, v. 34, no. 8, 1961, 1769-1775

TEXT: In the present paper, electron-microscopic and thermographic studies of the sintered mixtures are reported. Equimolecular mixtures of HfO_2 (previously heated at 1650°C) and Ba, Sr and Ca carbonates were heated to 800 - 1000°C and examined by electron microscopy and chemical phase analysis. In a specimen formed from $BaCO_3$ - HfO_2 heated to 1000°C for 15 minutes, 12.2% $BaHfO_3$ formed. The electron microscope showed, in addition to large HfO_2 crystals, fine ($< 0.1\mu$) crystals of $BaCO_3$. At 800°C, 7.8% $BaHfO_3$ is formed and stratification of HfO_2 crystals observed. Using the device of Keler and Kuznetsov, (Ref. 3: DAN SSSR, 1953, vol. 88, no. 6, 1031),

Card 1/3

Electron microscopic...

heating at a rate of 12 - 13° per minute, composite thermal analysis of the HfO_2 - $BaCO_3$ mixture was carried out giving a thermogram. In $SrCO_3$ - HfO_2 mixtures heated at 1000°C for 15 minutes, small crystals with a characteristic dendritic structure were observed and are attributed to solvability of $SrCO_3$ decomposition products by the 95% alcohol used in preparing the specimen for electron microscopy. When the same mixture was heated for 2 hours, no dendrites were observed. With $CaCO_3$, the structures observed are similar to those with $BaCO_3$. In none of the 3 systems studied was formation of a dense layer around HfO_2 grains observed, this being attributed to the molecular volume of the reaction products exceeding that of HfO_2. Products obtained at 1000 - 1200°C are porous and of loose structure. During the solid-phase reactions, the reaction products are stripped off the reacting surface to expose HfO_2 grains. Under these conditions, the role of volumetric diffusion becomes less important and the reaction rate is basically determined by the rate of chemical interaction of the mixture, dense non-porous products cannot be produced in one process but the formation of open-structure products facilitates pulverization. It is, therefore, advisable, in making

Card 2/3

Electron microscopic...

ceramic materials from these products, to carry out synthesis separately, subsequently pulverizing, pressing and sintering. There are 6 figures and 10 references: 7 Soviet-bloc and 3 non-Soviet-bloc. The references to the English-language publications read as follows: C.E. Curtis, L.M. Doney and J.R. Johnston, J. Amer. Cer. Soc. 1954, vol. 37, no. 10, 458; G.H.B. Lovell, Trans. Brit. Cer. Soc. 1951, vol. 50, 315; I.H. Chesters, L. Lee and J. Mackenzie, Trans. Brit. Cer. 1949, vol. 48, 260.

SUBMITTED: November 14, 1960

Card 3/3

15.2400

27910
S/080/61/034/010/002/016
D231/D301

AUTHORS: Keler, E. K., and Kuznetsov, A. K.

TITLE: Synthesis and physical-technical properties of the zirconates of strontium and barium

PERIODICAL: Zhurnal prikladnoy khimii, v. 34, no. 10, 1961, 2146-2153

TEXT: The aim of the present work is to make a fuller study of Sr and Ba zirconates and of the properties of ceramics based on them. The basic methods used were those of complex thermal analysis, X-ray phase, chemical phase and microscopic analysis. Thermographic investigation of the formation of $SrZrO_3$ and $BaZrO_3$ shows individual peculiarities; for the mixture $SrCO_3$-ZrO_2 there are two endothermic effects: the first in the range 900-950°, corresponding to a polymorphic transition of $SrCO_3$ from a rhombic to a hexagonal form; the second at about 1190°, at which $SrCO_3$ dissociates. Loss of weight begins at 800° and proceeds very vigorously in the 900-1150°

Card 1/4

Synthesis and...

range. For the mixture $BaCO_3$-ZrO_2, four endothermic effects are evident: the first two at 820° and 980°, corresponding to a polymorphic transition of $BaCO_3$; the third in the 1000-1200° range, due to dissociation of the $BaCO_3$; and the fourth with a temperature minimum at 1150° resulting from the fusion of basic $BaO.BaCO_3$ in the undissociated $BaCO_3$. Both the Sr and Ba compounds show increased volumes of the samples in the given temperature range. In the case of Sr, the increase takes place after decomposition of the $SrCO_3$, while with Ba the increase runs parallel with the dissociation of $BaCO_3$. Chemical analysis confirmed that there is a connection between volume increase and formation of the zirconate. At 900° (when volume increase commences) the percentage of $SrZrO_3$ present is 3.86, and at 1200° (temperature of maximum increase) this figure is raised to 72.9. Similar figures are shown for $BaZrO_3$ (at 900° - 15.8% and at 1050° - 63.9%). X-ray diffraction pattern analysis shows that formation of $SrZrO_3$ is practically

Card 2/4

Synthesis and...

complete at 1200° and that samples of the $BaCO_3$-ZrO_2 mixture fired at 1050° show diffraction patterns analogous to pure $BaZrO_3$; their form is unchanged with a further rise of temperature. The chief proportion of $SrZrO_3$ is formed in the first 15 minutes and equilibrium is reached in 1 hour. Similar results are recorded for $BaZrO_3$. Articles made of Sr or Ba zirconates, even at high firing temperatures, have a high porosity, and an effective mineralizer was found in boric acid, previously described in literature. Addition of this agent lowered the sintering temperature and generally improved the ceramic properties of the "body," but it was discovered that boric acid lowered the percentage of zirconate and led to the formation of a solid solution (this in the case of $CaZrO_3$). Additions of tristrontium borate and tribarium borate respectively to zirconates of Sr and Ba permits lowering of the sintering temperature of ceramics based on them by 200°; they also improve their physical and technical properties. Sr and Ba zirconates with additions of mineralizers can find use not only in electro-ceramics, but also as high heat-resistance materials. There are

Card 3/4

Synthesis of...

8 figures, 1 table and 14 references: 10 Soviet-bloc and 4 non-Soviet-bloc. The reference to the English-language publication reads as follows: P. S. Dear, Bl. Politech. Inst., 51 (8), Eng. exp. stand. ser., 126, 1-10 (1958).

SUBMITTED: December 29, 1961 [Abstractor's note: Misprint--1960 understood]

Card 4/4

29444
S/030/62/000/003/003/007
B116/B104

24,3300 (1051, 1057, 1163)

AUTHORS: Toropov, N. A., Keler, E. K., Leonov, A. I., Rumyantsev, P. F

TITLE: High-temperature microscope

PERIODICAL: Akademiya nauk SSSR. Vestnik, no. 3, 1962, 46-48

TEXT: A high-temperature microscope developed at the Institut khimii silikatov Akademii nauk SSSR (Institute of Silicate Chemistry of the Academy of Sciences USSR) is described. Its main components are: the МП-3 (MP-3) polarizing microscope, a high-temperature chamber attached to the microscope stage, and a lamp. The heater 1 (Fig. 1) in the chamber is controlled by the economy transformer 2 (2 a) and the step-down transformer 3 (220/6 v). The lamp 6 is controlled by the economy transformer 7 (2 a, 220/127 v). The temperature is measured by the Pt-Rh thermocouple 8 and the potentiometer 9. The temperature of microobjects can also be determined by measuring the voltage at the heater. The microscope features microtelephoto lenses with an operating distance of about 14 mm. Maximum magnification is 240. Melting, crystallization, and polymorphous conversions of crystalline substances can be observed at high temperature in the

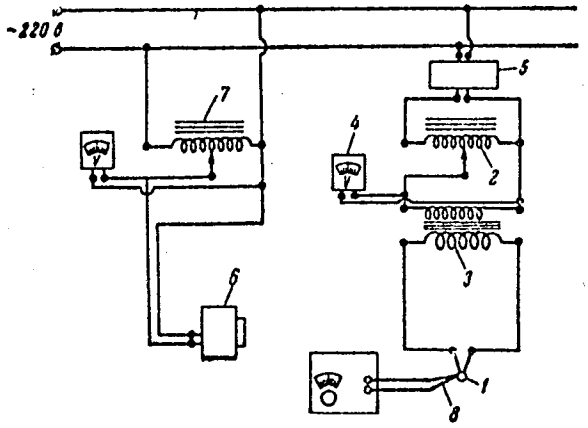
Card 1/2

S/030/62/000/003/003/007
B116/B104

High-temperature microscope

transmitted polarized light and in the reflected light. The wetting of metals with nonmetallic liquids can be studied. Experiments can be conducted in oxidizing, inert, and reducing gas media. There are 4 figures.

Fig. 1. Circuit diagram of the high-temperature microscope.



Card 2/2

S/131/62/000/004/002/002
B105/B101

N.YY30

AUTHORS: Keler, E. K., Andreyeva, A. B.

TITLE: Effect of iron oxide on the sintering of zirconium masses, and the process for stabilizing zirconium dioxide

PERIODICAL: Ogneupory, no. 4, 1962, 184 - 192

TEXT: The effect of iron oxide on the properties of refractory zirconium products was studied so far as common Fe_2O_3 impurities of commercial zirconium dioxide, and Fe_2O_3 introduced during grinding and burning are concerned. Commercial and pure zirconium dioxide were used as initial materials. Chemical composition of the industrial zirconium dioxide: 98.4% ZrO_2; 1.2% TiO_2; 0.11% Fe_2O_3; 0.08% CaO; 0.11% SO_4. Pure zirconium dioxide with 99.7% ZrO_2 content is produced from zirconium sulfate by calcination at 1200°C. Stabilization was brought about by means of MgO or CaO. Iron oxide admixture was found to lower the sintering temperature of zirconium mixtures by 200 - 250°C. The elastic moduli of the samples

Card 1/2

Effect of iron ... ...

stabilized by means of magnesium oxide were found to rise strongly when introducing up to 3% iron oxide and firing at 1400°C, and 1% at 1700°C. Iron oxide may be used as mineralizer for the production of dense zirconium materials when burning at up to 1400°C. At burning temperatures above 1500°C, part of the magnesium oxide, with ZrO_2, forms a solid solution and stabilizes it partly in cubical form, although the monoclinic structure remains as principal structure. Magnesium ferrite does not react with ZrO_2 below 1400°C. When admixing iron oxide to ZrO_2 - CaO mixtures and synthetized calcium ferrite to ZrO_2, a solid ZrO_2 - CaO solution is formed at a temperature of up to 1400°C, the X-ray lines of which are shifted in the direction of reduction of the interplanar spacing, as compared to the pure solid solutions. Admixture of iron oxide accelerates decomposition of the solid solutions of ZrO_2 with CaO and MgO. There are 7 figures and 7 tables.

ASSOCIATION: Institut khimii silikatov AN SSSR (Institute of Silicate Chemistry AS USSR)

Card 2/2

34968
S/080/62/035/002/003/022
D204/D302

15.2210

AUTHORS: Keler, E. K. and Kuznetsov, A. K.

TITLE: The formation and physico-technical properties of yttrium oxy-orthosilicate $Y_2O.SiO_4$

PERIODICAL: Zhurnal prikladnoy khimii, v. 35, no. 2, 1962, 250-256

TEXT: $Y_2O_3.SiO_2$ was prepared from Y_2O_3 (grain size 1 - 3 μ) and crystobalite (3 - 6 μ) by heating at 1100, 1200, 1300, 1400, 1500 and 1600°C for 2-hour periods, regrinding and reheating. The products were analyzed by chemical, X-ray and thermal methods. It was found that the yield of $Y_2O_3.SiO_2$ rose from 8.8% at 1200°C to 55.2% at 1500°C and was 93.0% at 1600°C. The reactions were slow up to 1300°C and fairly rapid, especially initially, above 1500°C. No appreciable thermal or volume changes were observed during the combination apart from the shrinkage due to sintering. Electron microscopy showed that the product formed a dense, adherent layer

Card 1/3

The formation and ...

around the SiO_2 particle through which Y_2O_3 had to diffuse - this is regarded as the rate controlling process. After 2 hours at 1600°C the product retained 25.4% porosity which fell to 2.9% when the temperature was raised to 1800°C. 2% amounts of BaO, SrO, PbO, ZnO, B_2O_3, Bi_2O_3, Fe_2O_3, Al_2O_3, TiO_2, V_2O_5 and MoO_3 were added to mixtures sintered at 1600°C for 2 hours in an effort to produce a dense material. Alumina was found to give the best results (1.6% porosity), the optimum quantity being 1%. The action of Al_2O_3 is discussed. Electrical properties were measured on 25 mm dia. x 3 mm discs formed over 2 hours at 1600°C, without mineralizers, showing that $Y_2O_3 \cdot SiO_2$ is a semi-conductor, of resistivity = 4.76 x 10^7 Ω-cm. 2% additions of Al_2O_3, B_2O_3, Bi_2O_3 or ZnO increased this value to 1 - 4.78 x 10^{10}. The dielectric permeability was 17.9 without, and 12.8 - 16.5 with mineralizers. A number of mechanical and technological properties of the compound is listed. The silicate is refractory to 1930°C and resists the attack of BeO, MgO, Al_2O_3,

Card 2/3

The formation and ...

TiO_2, ZrO, V_2O_5, MoO_3 and SiC to, but not above, 1400°C. There are 6 figures, 3 tables and 10 references: 8 Soviet-bloc and 2 non-Soviet-bloc. The references to the English-language publications read as follows: C. E. Curtis, J. Am. Cer. Soc., 40, 8, 274, (1957); R. Roy, Am. Cer. Soc. Bull., 38, 4, 169, (1959).

SUBMITTED: January 25, 1961

Card 3/3

S/131/62/000/007/002/003
B117/B138

AUTHORS: Keler, E. K., Andreyeva, A. B.

TITLE: Investigation of the solid solution range in the ZrO_2 - SiO_2 system

PERIODICAL: Ogneupory, no. 7, 1962, 327-332

TEXT: The presence of solid solutions in the ZrO_2 - SiO_2 system was studied as opinions differ on this problem. The authors used ZrO_2 mixtures containing 3, 5, 10, 15, and 20 mole% of SiO_2, heated to 1500-2050°C, and zirconium dioxide samples with previously synthesized zirconium ($ZrSiO_4$). X-ray diffraction, (Debye - Scherrer patterns and ionization curves), optical (transmission method with powders in an immersion liquid, with magnification X 750, and reflection method using sections, with X 144), and dilatometric methods showed the same results. There was no shift of the diffraction maxima in the range of large angle scattering, characteristic of such as would indicate the formation of solid solutions. ZrO_2 and SiO_2 did not react when heated to 1500°C. A rise in temperature to 1700-1750°C

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S/131/62/000/007/002/003
B117/B138

Investigation of the solid ...

caused intensive formation of $ZrSiO_4$. Further heating to 2000°C reduced the weight of the samples and increased their porosity. This may be due to the dissociation of zirconium into ZrO_2 and SiO_2 with evaporation of the latter. Summary: Contrary to N. A. Zhirnova's assertions (Z. anorg. allg. Chem. 1934, 218, 193), no solid phase was found in the ZrC_2-rich region of the system. This agrees with B. Weber's and M. Schwarz's results (Ber. Deutsch Ker. Ges., 1957, no. 12). There are 6 figures and 5 tables.

ASSOCIATION: Institut khimii silikatov AN SSSR (Institute of Silicate Chemistry AS USSR)

Card 2/2

ISKHAKOV, Kh.Sh.; KELER, E.K.

Solid phase reactions in the system $SrO - TiO_2 - ZrO_2$.
Zhur. neorg. khim. 7 no.8:1946-1957 Ag '62. (MIRA 16:6)

1. Institut khimii silikatov AN SSSR.
(Strontium oxide) (Titanium oxide)
(Zirconium oxide)

ISKHAKOV, Kh.Sh.; KELER, E.K.

Conditions for the formation and the electrical properties of solid solutions of $SrTiO_3$ - $SrZrO_3$. Zhur. neorg. khim. 7 no.8:1958-1963 Ag '62. (MIRA 16:6)

1. Institut khimii silikatov AN SSSR.
(Strontium titanate--Electric properties)
(Strontium zirconate--Electric properties)
(Solutions, Solid)

KELER, E.K.; KUZNETSOV, A.K.

Formation and physical and technological properties of yttrium oxyorthosilicate, $Y_2O[SiO_4]$. Zhur.prikl.khim. 35 no.2:250-256 F '62. (MIRA 15:2)

(Yttrium compounds)

KELER, E.K.; ANDREYEVA, A.B.

Effect of iron oxide on the sintering of a zirconium mixture and the stabilization process of zirconium dioxide. Ogneupory 27 no.4:184-192 '62. (MIRA 15:4)

1. Institut khimii silikatov AN SSSR.
(Zirconium oxide) (Iron oxide)

S/062/62/000/011/001/021
B101/B144

AUTHORS: Leonov, A. I., and Keler, E. K.

TITLE: High-temperature reactions between Ce_2O_3 and Al_2O_3, and properties of the resulting cerium-aluminates

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye khimicheskikh nauk, no. 11, 1962, 1905 - 1910.

TEXT: Mixtures of CeO_2 and Al_2O_3 were heated to 1000 - 1750°C in H_2 or NH_3 atmosphere. The CeO_2 was reduced to Ce_2O_3, which reacted with the Al_2O_3. The component ratio was varied between Ce_2O_3 : Al_2O_3 = 8 : 1 and 1 : 14. The resulting products were subjected to a thermogravimetric oxidative analysis; the polymorphic conversions and the melting points in H_2 atmosphere were investigated with a high-temperature microscope; and the powder patterns of the compounds were recorded. Results: (1) From the equimolar Ce_2O_3 + Al_2O_3 mixture, the compound $CeAlO_3$ was synthesized after 2 hrs

Card 1/3

High-temperature reactions between...

heating at 1650°C; this compound crystallizes cubically, has a lattice constant a = 3.78 Å, specific gravity 6.17, N_m = 2.02, mean birefringence (~0.01), m.p. in H_2 atmosphere 2075 ± 25°C. In mixtures of particle size <5μ, $CeAlO_3$ already formed at 1000°C. When heated in air to 1200°C, this compound disintegrates into CeO_2 and Al_2O_3 within 1 hr. Polymorphic conversions of $CeAlO_3$ were observed at 90 ± 20 and 980 ± 20°C. Transition from rhombic to rhombohedral, and further to cubic lattice is assumed, but further x-ray studies are required to clarify the crystal structures. (2) In the mixture $1Ce_2O_3 \cdot 8Al_2O_3$, the compound $Ce_2O_3 \cdot 11Al_2O_3$ was found after 3 hrs at 1670°C. Mixtures of ratio 1 : 12, 1 : 14 contained α-Al_2O_3 as well. The compound $Ce_2O_3 \cdot 11Al_2O_3$ has the structure of β-alumina, and melts in H_2 atmosphere at 1950 ± 25°C; specific gravity 4.07, N_m = 1.80, weak birefringence. Heating in air at 1450°C leads to complete oxidation within 1 hr. Electrical properties at 295°K are: tan ϑ = $37 \cdot 10^{-4}$, ε = 16 at 71 kc/sec; tan ϑ = $34 \cdot 10^{-4}$, ε = 17 at 710 kc/sec. At room temperature

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S/062/62/000/011/001/021
B101/B144

High-temperature reactions between...

$Ce_2O_3 \cdot Al_2O_3$ does not oxidize in air, and is resistant to acids. Concentrated hydrofluoric acid showed no corroding action after 30 days. There are 7 figures and 3 tables. The most important English-language references are: S. J. Schneider, R. S. Roth, I. L. Waring, J. Res. Nat. Bur. Standards, 65A, N 4, 345 (1961); R. S. Roth, S. Hasko, J. Amer. Ceram. Soc., 41, no. 4, 146 (1958).

ASSOCIATION: Institut khimii silikatov Akademii nauk SSSR (Institute of Silicate Chemistry of the Academy of Sciences USSR)

SUBMITTED: April 2, 1962

Card 3/3

TOROPOV, N.A.; KELER, E.K.; LEONOV, A.I.; RUMYANTSEV, P.F.

High-temperature microscope. Vest. AN SSSR 32 no.3:46-48 Mr '62. (MIRA 15:2)

(Microscope)
(Materials at high temperatures)

FAN' FU-KAN [Fan Fu-k'ang]; KUZNETSOV, A.K.; KELER, E.K.

Phase relations in the system Y_2O_3 - ZrO_2. Report No.1: On the existence of yttrium zirconate and its physicochemical properties. Izv.AN SSSR.Otd.khim.nauk no.7:1141-1146 Jl '62. (MIRA 15:7)

1. Institut khimii silikatov AN SSSR.
(Yttrium oxide) (Zirconium oxide) (Phase rule and equilibrium)

S/131/62/000/012/003/004
B117/B186

AUTHORS: Keler, E. K., Chang Ch'ing-ch'un

TITLE: Elastic properties of some clays and kaolins, depending on their heat treatment

PERIODICAL: Ogneupory, no. 12, 1962, 557 - 566

TEXT: The influence of heat treatment conditions on the elastic properties of clays from the following deposits was studied: Latnaya, Druzhkovka, Prosyanaya, Niu-Hsing-T'ai, Fu-Chou, and Su-Chou. Specimens were shaped half-dry (400 kg/cm^2, 8% moisture) from 70% clay, as well as from 30% fire clay produced by firing the same clay at 1300°C. Test temperatures ranged from 600 to 1400°C. X-ray phase diagrams of the specimens revealed partial formation of γ-Al_2O_3 and intensive formation and mullite due to two exothermic reactions. At 1300 - 1400°C, all specimens contained cristobalite. The materials, which had different sintering temperatures and ranges, were submitted to constant and periodic loads at steady increase of temperature (300°C/hr). Deformations were measured after 50°C

Card 1/3

in each case. Torsion, pressure, tension, and bending tests showed the following results: the elastic properties of clays are in direct relation with the physicochemical transformations, and may be used to estimate structural changes. Certain weakening effects were observed under constant loads during dehydration, which may be considered as residual strains. Though the structure is also weakened during the two exothermic reactions, cracking is inhibited by the structural mobility, particularly during the first exothermic reaction, despite the temperature gradients in the material. The temperature at which plastic deformation sets in, and the further development of flowability of the body depend on the content of flux admixtures. The crystallization of mullite prevents plastic deformations. The elastic properties of clays are affected also by physical factors such as degree of dispersion, density, miscibility with water, etc. The heat treatment responsible for the phase composition is the main factor in determining the elastic properties of clays. The elastic modulus of the material, which is brittle below 700 - 800°C, increases with increasing temperature, due to heat expansion of the particles. This is, e.g., important for heterogeneous materials with high quartz content. Problems concerning industrial production of fire clay refractories were studied in connection with investigations by the Vsesoyuznyy institut

ogneuporov (All-Union Institute of Refractories). There are 8 figures and 5 tables.

ASSOCIATION: Institut khimii silikatov AN SSSR (Institute of Silicate Chemistry AS USSR)

KELER, E.K.; ANDREYEVA, A.B.

Investigating areas of solid solutions in the system ZrO_2 - SiO_2. (MIRA 15:8)
Ogneupory 27 no.7:327-332 '62.

1. Institut khimii silikatov AN SSSR.
(Systems (Chemistry)) (X rays--Diffraction)

KELER, E.K. [Keler, Ye.K.]; B[redacted], M.N. [Bluvshteyn, M.N.]

Lining of blast furnace wells. Analele metalurgie 16 no.3:168-176 Jl-S '62.

KELER, E.K.; CHZHAN TSIN-CHUN' [Chang Ch'ing-ts'un]

Elastic properties of certain clays and kaolins depending on their heat treatment. Ogneupory 27 no.12:557-566 '62. (MIRA 15:12)

1. Institut khimii silikatov AN SSSR.
(Clay—Elastic properties)
(Kaolin—Elastic properties)

KELER, E.K.; ANDREYEVA, A.B.

Formation and properties of solid solutions of zirconium dioxide with rare-earth metal oxides. Ogneupory 28 no.5: 224-231 '63. (MIRA 16:6)

1. Institut khimii silikatov AN SSSR.
(Zirconium oxide)
(Rare earth metals)
(Refractory materials)

KELER, E.K.; BLUVSHTEYN, M.N.; BORICHEVA, V.N.; GREBENNIKOVA, Z.Ye.

New device and method of tensile testing refractories at high temperatures. Ogneupory 28 no.7:312-317 '63. (MIRA 16:9)

1. Vsesoyuznyy institut ogneuporov.

KELER, E.V., doktor tekhn. nauk; GLUVSHTEYN, M.M., kand. tekhn. nauk; BORICHEVA, V.N., kand. tekhn. nauk; GRIBENNIKOVA, Z.Ye., inzh.

New equipment and improved methods of high temperature testing of the tensile strength of refractories. Trudy Inst. ogneup. no.34:193-209 '63. (MIRA 17:10)

BR

ACCESSION NR: AR4015662 S/0081/63/000/021/0335/0335

SOURCE: RZh. Khimiya, Abs. 21M35

AUTHOR: Keler, E. K.; Bluvshteyn, M. N.; Borlcheva, V. N.; Grebennikova, Z. Ye.

TITLE: New equipment and an improved procedure for tensile strength tests of refractory materials at high temperatures

CITED SOURCE: Tr. Vses. gos. in-ta nauchno-issled. i proyektn. rabot ogneuporn. prom-sti, vy*p. 34, 1963, 193-209

TOPIC TAGS: refractory material, refractory material tensile strength, tensile strength test, high temperature tensile strength, high temperature tensile strength tester

ABSTRACT: New and improved equipment was constructed and introduced to industrial practice, and a procedure was developed for high temperature tests (up to 1700C) of refractory materials for tensile strength. Experimental data were obtained on the tensile strength of fireclay, magnesite, magnesiochromite, Dinas brick and non-fired refractories. The curves from repeat experiments were noted to show good coincidence. Bibl. with 11 references. Authors' summary.

Card 1/1 DATE ACQ: 09Dec63 SUB CODE: MA ENCL: 00

L 10512-63 EWP(q)/EWT(m)/BDS--AFFTC/ASD--JD

ACCESSION NR: AP3000638 S/0080/63/036/003/0480/0489

AUTHOR: Iskhakov, Kh. Sh.; Kelar, E. K.

TITLE: The effect of borides on the formation and the physicotechnical properties of strontium titanate--strontium zirconate solid solutions

SOURCE: Zhurnal prikladnoy khimii, v. 36, no. 3, 1963, 480-489

TOPIC TAGS: boric anhydride, solid solution, strontium titanate, strontium zirconate, strontium boride, ceramic property, mineralizer

ABSTRACT: The effect of B_2O_3 on the formation and the physicotechnical properties of $SrTiO_3$--$SrZrO_3$ solid solutions, which exhibit electrical properties making them suitable for use in the radio engineering industry, have been studied. To the mixtures $SrCO_3 + ZrO_2$ (1:1), $SrCO_3 + TiO_2$ (1:1), and $SrCO_3 + TiO_2 + ZrO_2$ (2:1:1), and powdered $SrZrO_3$ and $SrTiO_3$ was added 3, 5, or 10 mol% B_2O_3 (as an equivalent amount of H_3BO_3). The resulting mixtures, after compacting at 800 kg/cm^2 and firing at 600 to 1450C, were studied by complex thermal, x-ray, and chemical analysis. Chemical analysis showed that in the presence of B_2O_3 there is a drop in the temperatures of formation and sintering

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L 10512-63

ACCESSION NR: AP3000638

and in the yield of $SrZrO_3$, $SrTiO_3$, and the $SrTiO_3$--$SrZrO_3$ solid solution from $SrCO_3 + ZrO_2$, $SrCO_3 + TiO_2$, and $SrCO_3 + TiO_2 + ZrO_2$, respectively. The yield drop was attributed to the fact that part of the strontium oxide forms strontium borates, while part of the TiO_2 and ZrO_2 remains unreacted. Hence, to improve the yield and the ceramic properties of $SrZrO_3$, $SrTiO_3$, and the $SrTiO_3$--$SrZrO_3$ solid solution, the mineralizer should be incorporated as presynthesized strontium borate rather than as B_2O_3. Study of the physicotechnical properties indicated that by use of 2 SrO B_2O_3 as the mineralizer, a mechanically strong body with a porosity close to zero can be obtained for $SrZrO_3$, $SrTiO_3$, and the $SrTiO_3$--$SrZrO_3$ solid solution. Thus, a body prepared from 60 mol% $SrTiO_3$, 40 mol% $SrZrO_3$ + 3 wt% 2 SrO B_2O_3 withstands three 20-1200C thermal cycles and exhibits a shrinkage of 20.1%, a water absorption of 0.02%, an apparent porosity of 0.15%, an apparent density of 5.066 g/cm^3, a linear expansion coefficient at 20--1200C of 9.5 x 10-6, a bending strength of 823 kg/cm^2, and a compressive strength of 3067 kg/cm^2. Orig. art. has: 6 figures and two tables.

ASSOCIATION: Institut khimii silikatov imeni I. V. Grebenshchikova AN SSSR (Institute of the Chemistry of Silicates, AN SSSR)

Card 2/3

ANDREYEVA, A.B.; KELER, E.K.

Conditions of sintering and the physical and technical properties of lanthanum silicates. Zhur. prikl. khim. 36 no.12:2605-2610 D'63. (MIRA 17:2)

1. Institut khimii silikatov AN SSSR.

L 17057-63 FCS(f)/EWP(q)/EWT(m)/BDS S/062/63/000/004/001/022
AFFTC/ASD Pad JD/HW/JG
AUTHOR: Fan Fu-k'ang, Kuznetsov, A. K., and Keler, E.K.

TITLE: Phase relations in the system Y_2O_3--ZrO_2. 2. Solid solutions

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye khimicheskikh nauk, no. 4, 1963, 601-610

TEXT: This article is based on the dissertation of Fan Fu-k'ang and was presented at the conference of the chief editors of journals of the Academy of Sciences USSR on 12 June 1962. Zirconium-yttrium solid solutions can be used possibly as solid electrolytes. However more data is needed on the Y_2O_3--ZrO_2 system. A new diagram of state is proposed for the system Y_2O_3--ZrO in the solid phase characterized by the presence of $Y_2Zr_2O_7$, absence of the single phase field of the monoclinical solid solution, different position of the phase boundaries of the solid solutions in the system. It was noted that the minimum quantity of Y_2O_3 needed to completely stabilize ZrO_2 depends on the annealing temperature to a considerable degree. A decrease in temperature during the

Card 1/2

Phase relations in the system.....

polymorphous rearrangement of ZrO_2 calcined with small additions of stabilizing oxides can be explained by the change in the repelling force between cations in the lattice of ZrO_2 due to the formation of a monoclinical solid solution of ZrO_2 of the substitution type. The degree of temperature decrease of the polymorphism depends on the value of this change. There are 7 figures and 2 tables.

ASSOCIATION: Institut khimii silikatov Akademii nauk SSSR (Institute of Chemistry of Silicates, Academy of Sciences USSR)

SUBMITTED: August 20, 1962

L 10114-63 EWP(q)/EWT(m)/BDS AEDC/AFFTC/ASD JD
ACCESSION NR: AP3000026 S/0131/63/000/005/0224/0231

AUTHOR: Keler, E. K.; Andreyeva, A. B.

TITLE: Formation and properties of solid solutions of zirconium dioxide with oxides of rare-earth elements

SOURCE: Ogneupory, no. 5, 1963, 224-231

TOPIC TAGS: refractories, zirconium dioxide, ceric oxide, lanthanum oxide, yttrium oxide, solid solutions, thermal stability, chemical stability, porosity, sintering, polymorphic transformations, thermal expansion, structure

TEXT: The formation and properties of solid solutions in the systems ZrO_2 -- CeO_2, ZrO_2 -- Y_2O_3, and ZrO_2 -- La_2O_3 have been studied. Specimens were compacted from mixtures of chemically pure oxides (70 to 95 or 20 mol % ZrO_2 and 30 to 5 or 80 mol % of the second oxide) under a pressure of 500 kg/cm sup 2, and fired at 1400-1700C. These specimens were subjected to chemical, x-ray, and dilatometric analyses, and

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L 10114-63
ACCESSION NR: AP3000026

their ceramic, elastic, electrical, and physical properties were studied. At 1400C the above systems form solid solutions with a cubic structure. The porosity of specimens heated at 1400C for 6 hrs is 30 to 40%; sintering occurs on heating to 1700-1750C for 3 hrs. In specimens containing 20 mol % CeO sub 2, 15 mol % Y sub 2 O sub 3, or 25 mol % La sub 2 O sub 3, ZrO sub 2 is fully stabilized by heating to 1700-1750C. Addition of CeO sub 2 or Y sub 2 O sub 3 lowers the temperature of the polymorphic transformation of ZrO sub 2. New highly refractive materials can be obtained by firing to 1750C the solid solutions ZrO sub 2 -- 20% CeO sub 2, ZrO sub 2 -- 80% CeO sub 2, ZrO sub 2 -- 15% Y sub 2 O sub 3, ZrO sub 2 -- 80% Y sub 2 O sub 3, and ZrO sub 2 -- La sub 2 O sub 3. Some of these materials have a lower thermal expansion coefficient and higher thermal stability (at 1200C) than ZrO sub 2 stabilized with CaO or MgO. The highest thermal and chemical stability is exhibited by ZrO sub 2 -- Y sub 2 O sub 3 solid solutions. Orig. art. has: 6 tables and 8 figures.

ASSOCIATION: Institut khimii silikatov AN SSSR (Institute of the Chemistry of Silicates AN SSSR)

SUBMITTED: 00 DATE ACQ: 12Jun63 ENCL: 00
SUB CODE: 00 NO REF SOV: 000 OTHER 009
Card 2/2

L 39937-65 EWG(j)/EEP(e)/EWT(m)/EWP(w)/EPF(c)/EWA(d)/EPR/T/EWP(t)/EWP(k)/
EWP(z)/EWP(b)/EWA(c) Pf-4/Pr-4/Ps-4 IJP(c) JD/JG

ACCESSION NR: AP5006932 S/0080/63/036/012/2605/2610

AUTHORS: Andreyeva, A. B.; Keler, E. K.

TITLE: Sintering and the physico-technological properties of lanthanum silicates

SOURCE: Zhurnal prikl. khimii, v. 36, no. 12, 1963, 2605-2610

TOPIC TAGS: rare earth silicates lanthanum silicates lanthanum [illegible] lanthanum orthosilicate, lanthanum [illegible]

ABSTRACT: This article specifically investigates sintering of [illegible]

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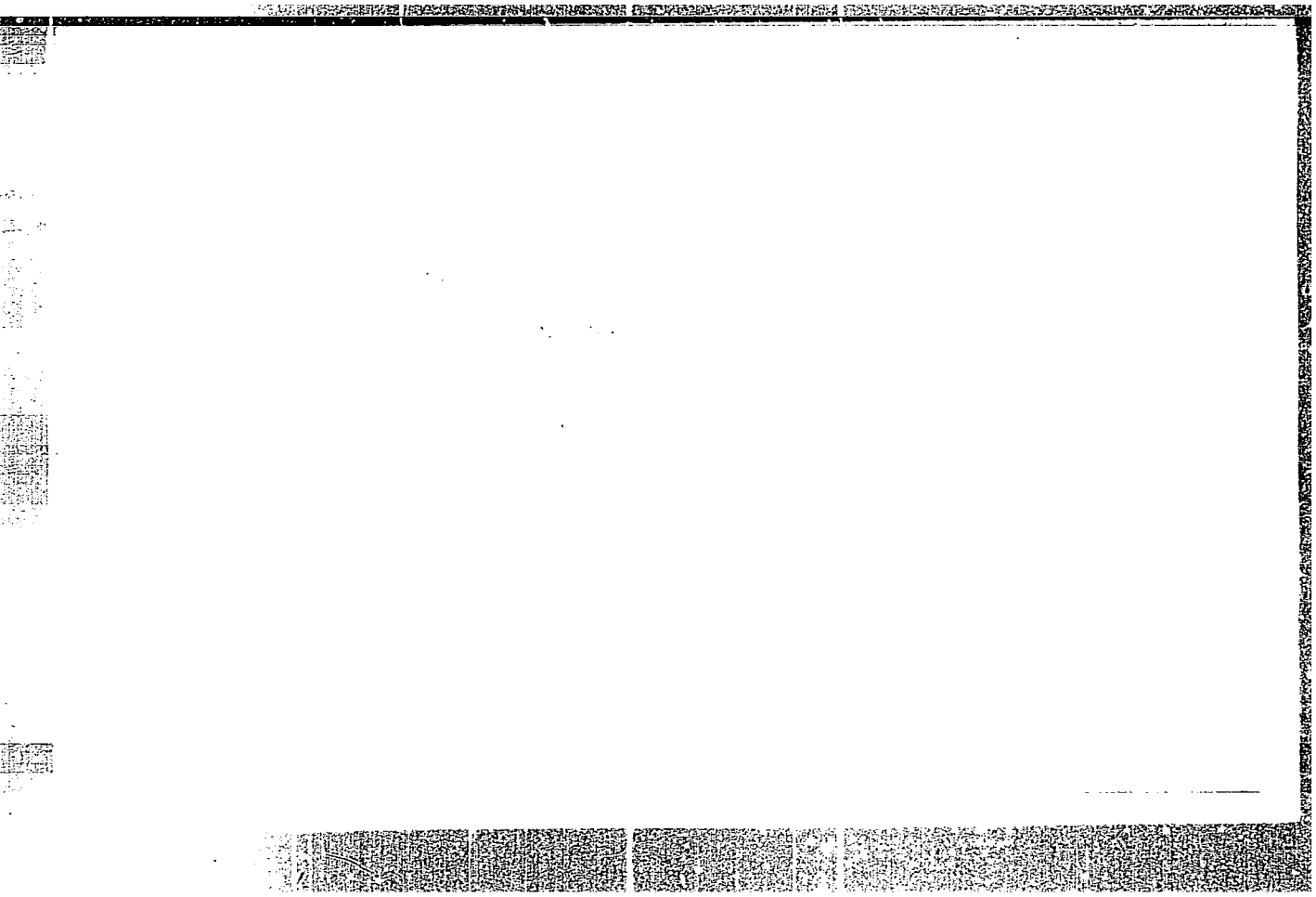
[illegible] which is attained at 1600-1700C (porosity greater

[illegible] a primary calcination at 1500C after [illegible] should follow. The best stable sintered produc[illegible] lanthanum pyrosilicate ($La_2O_3 \cdot 2SiO_2$). Mixtures of ortho- and [illegible] oxysilicates without additives obtained in the air in a few [illegible] calcining at 1440C or in a few days after calcining at



APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000721510006-9"

L 18964-63 EWP(q)/EWT(m)/BDS AFFTC/ASD Pq-4 WH/JD/JG

ACCESSION NR: AP3006599 S/0020/63/151/006/1368/1370

AUTHORS: Keler, E. K.; Kozlovskaya, Ye. I.

TITLE: Elasticity and crystal formation in glasses.

SOURCE: AN SSSR. Doklady*, v. 151, no. 6, 1963, 1368-1370.

TOPIC TAGS: glass, heat treatment, glass crystallization, high temperature microscope, strength of glass, endothermic effect, exothermic effect, Al, K, Li, Si, Mg, Ti.

ABSTRACT: Mechanical properties of Al-K-Li-Si and Al-Mg-Ti-Si glasses were investigated. In temperature range from 20C to vitrification temperature (T_g), the glass deformation is uniform. From T_g to temperature of effective crystallization T_k, a sudden increase of deformation occurs. An exothermic effect accompanies this step. After that, deformation rate declines slightly. Then, with a further increase in temperature, a second increase of deformation takes place. After that, the deformation curve is parallel

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ACCESSION NR: AP3006599

2

to the abscissa up to temperature at which the glass completely liquefies. Decline and rise in deformation rate coincides with endo- or exothermic effects. Extent and nature of deformations was investigated by heat treatment and observation in high temperature microscope. These observations show that, up to temperature T_g, no crystal formation can be observed, but, between temperatures T_g-T_x, the formation of crystalline inclusions can be observed, which, with increase of temperature, grow in size until all glass is converted into one fine crystalline structure. Modulus of elasticity of this structure at room temperature is higher than that of corresponding original glass. Orig. art. has: 4 figures.

ASSOCIATION: Institut khimii silikatov im. I. V. Grebenshchikova Akademii nauk SSSR (Institute of silicate chemistry, Academy of sciences, SSSR).

GLUSHKOVA, V.B.; KELER, E.K.

Polymorphism of lanthanum oxide. Dokl. AN SSSR 152 no.3:611-614 S '63. (MIRA 16:12)

1. Institut khimii silikatov im. I.V.Grebenshchikova AN SSSR. Predstavleno akademikom A.N.Frumkinym.

KELER, E. K. and BEREZHNOY, A.S.

"Problems of high-temperature refractory oxide ceramics"

(Institute of Silicate Chemistry) (Ukrainian Institute of Refractory Materials)
for KELER for Berezhnoy

At the Division of Physical Chemistry and Technology of Inorganic Materials, Acad. Sci. USSR, a scientific council on the problem of sitalls has been established. The Council is coordinating body for basic scientific research on sitalls, glass, fiber glass, stoneware, refractory and superrefractory materials, and coatings. The purpose of the Council is primarily to contribute to the improvement of the strength and impact resistance of existing materials. In 1963, the council held two sessions.
(Steklo i keramika, no. 6, 1964, 48-49)

ACCESSION NR: AP4012446 S/0078/64/009/002/0394/0402

AUTHORS: Isupova, Ye. N.; Keler, E. K.

TITLE: Reaction in the BaO--BeO system

SOURCE: Zhurnal neorg. khim., v. 9, no. 2, 1964, 394-402

TOPIC TAGS: barium oxide containing system, beryllium oxide containing system, thermal analysis, x-ray analysis, chemical analysis, microscopic analysis, barium beryllium sub 3 oxygen sub 4, barium sub 2 beryllium sub 3 oxygen sub 4, density, optical property, crystal lattice dimension, phase diagram

ABSTRACT: As a partial investigation of the reaction in the BaO-BeO-SiO_2 system, the reaction of the oxides in the BaO--BeO system was studied to determine composition, temperature conditions and physical properties of the compounds formed in the 900-1300C temperature interval (fig. 1). Thermal, x-ray, chemical and microscopic (in daylight and ultraviolet light) analyses were used. Two compounds exist in the system: $Ba_2Be_3O_5$ (d_4^{25} = 4.53 gm./cc., melting 1725C) and $BaBe_3O_4$ (d_4^{25} = 4.06 gm./cc., melting 1540C). $BaBe_3O_4$ is formed at temperatures above 1280C but decomposes below 1200C to $Ba_2Be_3O_5$ and

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ACCESSION NR: AP4012446

BeO. The optical and some chemical properties of the two compounds were determined. The parameters of the $Ba_2Be_2O_5$ lattice were calculated: a_o = 7.40Å, b_o = 9.40Å, c_o = 19.4Å. Orig. art. has: 6 figures and 2 tables.

ASSOCIATION: None

SUBMITTED: 21Feb63 DATE ACQ: 26Feb64 ENCL: 01

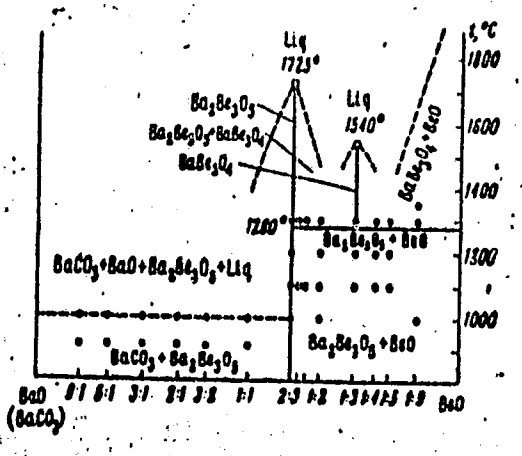
SUB CODE: PH, CH NR REF SOV: 002 OTHER: 005

Card 2/3

ACCESSION NR: AP4012446 ENCLOSURE: 01

Fig. 1

Phase diagram of the composition of the BaO--BeO system.



Card 3/3

ACCESSION NR: AP4012447 S/0078/64/009/002/0403/0413

AUTHORS: Isupova, Ye. N.; Keler, E. K.

TITLE: Reaction in the BaO-- BeO--SiO_2 system

SOURCE: Zhurnal neorg. khim., v. 9, no. 2, 1964, 403-413

TOPIC TAGS: barium oxide containing system, beryllium oxide containing system, silicon dioxide containing system, phase diagram, $Ba_2Be_3O_5$, $BaBeSiO_4$, $BaBe_2Si_2O_7$, Ba_2SiO_4, $BaSiO_3$, interplanar distance, physical properties, density, optical properties, synthesis, barylite

ABSTRACT: The reaction of the oxides in the BaO--BeO--SiO_2 system was studied. Phase diagram (fig. 1) shows the following compounds are obtained: $Ba_2Be_3O_5$, $BaBeSiO_4$, $BaBe_2Si_2O_7$, Ba_2SiO_4 and $BaSiO_3$. The interplanar distances were measured and the chemical and physical properties (density, optical characteristics) of $BaBeSiO_4$ and $BaBe_2Si_2O_7$ were studied; the latter compares with the chemical properties of the mineral barylite. Temperature and calcining time for the synthesis of $BaBe_2Si_2O_7$ and $BaBeSiO_4$ were determined (fig. 2): optima for the first compound 8-10 hours at 1350C, 77% yield; for the

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ACCESSION NR: AP4012447

second, 5 hours at 13500, 90% yield. Orig. art. has: 7 Figures, 5 Tables and 2 Equations.

ASSOCIATION: None

SUBMITTED: 21Feb63 DATE ACQ: 26Feb64 ENCL: 02

SUB CODE: PH NR REF SOV: 011 OTHER: 003

Card 2/2

ACCESSION NR: AP4019487 S/0078/64/009/003/0633/0640

AUTHOR: Andreyeva, G. T.; Keler, E. K.

TITLE: Synthesis of the compound $6BaO.Nb_2O_5$ in the solid phase

SOURCE: Zhurnal neorg. khimii, v. 9, no. 3, 1964, 633-640

TOPIC TAGS: 6BaO. Nb sub 2 O sub 5, solid phase synthesis, niobium pentoxide, crystalline structure, monotropic conversion, 5BaO. 2Nb sub 2 O sub 5, crystal lattice parameters, chemical stability, Nb sub 2 O sub 5 monotropic transition

ABSTRACT: A study of the behavior of Nb_2O_5 confirmed its existence in two modifications; the conditions for their monotropic conversion were investigated (the high temperature specie is formed at 1100-1200C). The conditions for the solid phase synthesis of $6BaO.Nb_2O_5$ by reacting 6:1 mixtures of $BaCO_3$ and Nb_2O_5 were studied. This compound is formed at elevated temperatures (2 hours at 1100C; 40 minutes at 1200C) via the intermediate $5BaO.2Nb_2O_5$. The fusion temperature, density, parameters of the crystal lattice, and chemical

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ACCESSION NR: AP4019487

stability of $6BaO.Nb_2O_5$ were determined: it melts without decompostion at 1930 ± 20degrees and decomposes readily on storage in air or contact with water. Orig. art. has: 4 figures and 2 tables.

ASSOCIATION: None

SUBMITTED: 19Jun63 DATE ACQ: 31Mar64 ENCL: 00

SUB CODE: CH NO REF SOV: 011 OTHER: 019

Card 2/2

MANDAL, G.; GODINA, N.A.; KELER, E.K.

Effect of admixtures of silica, titanium dioxide and aluminum oxide on the properties and phase composition of zirconia materials stabilized by cerium dioxide. Ogneupory 29 no.11:513-520 '64.
(MIRA 18:1)

1. Institut khimii silikatov AN SSSR.

ACCESSION NR: AP4039617 S/0076/64/038/005/1126/1134

AUTHORS: Glushkova, V.B. (Leningrad); Sokolov, Yu.G. (Leningrad); Keler, E.K. (Leningrad)

TITLE: Oxidation of metallic neodymium and the rate of the C → A polymorphic transformation of Nd sub 2 O sub 3

SOURCE: Zhurnal fizicheskoy khimii, v. 38, no. 5, 1964, 1126-1134

TOPIC TAGS: neodymium oxidation, neodymium oxidation rate, neodymium sequioxide, neodymium sequioxide A, neodymium sequioxide C, neodymium oxide C→A transformation, neodymium oxide crystal lattice, neodymium sequioxide stable form, anion vacancy, cation vacancy

ABSTRACT: The oxidation rate of powdered Nd was studied in the air and in thoroughly dried oxygen. The equipment, which is described and figured, was set up so as to provide for continuous weighing of the 0.1 - 0.3 g sample at 1.10^{-1} to 760 mm Hg pressures and 20-1500C temperatures. In preliminary tests with oxygen it was found that at an oxygen pressure of over 10 mm Hg the oxidation rate does not depend upon further pressure changes. Thus tests were then conducted at 100 mm pressure. The results are tabulated and graphed. At 240-

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ACCESSION NR: AP4039617

3000 temperatures the oxidation rate showed linear dependency; this decreased as the oxide layer increased so as to become a parabolic curve. In dry oxygen the constant of the oxidation rate was found: $C = 6.10.10^{9} min^{-1}$ and the activation energy $E = 38.93 \pm 0.05$ kcal. The A-form was produced upon oxidation in dry oxygen at 250 - 5000 (X-ray determination) and was the only stable form of the sesquioxide up to 12000. In another series of tests investigation the change C→A Nd_2O_3 at various temperatures the cubic form was used as starter material. The change was shown to occur at 800-1000 and did not reverse upon subsequent cooling. The rate of transformation C→A depended upon the degree of perfection of the crystal lattice of the metastable C-form. Lesser perfection resulted in transformation at lower temperatures. The activation energy of the 99.9% pure specimen was $E = 100.26 - 0.04$ kcal and the constant $C = 1.03.10^{16}$ $min.^{-1}$. Orig. art. has: 6 tables, 6 figures and 4 formulas.

ASSOCIATION: Institut khimii silikatov im. I.V. Grebenchshikova AN SSSR (Institute of Silicate Chemistry, AN SSSR)

SUBMITTED: 26Apr63 ENCL: 00

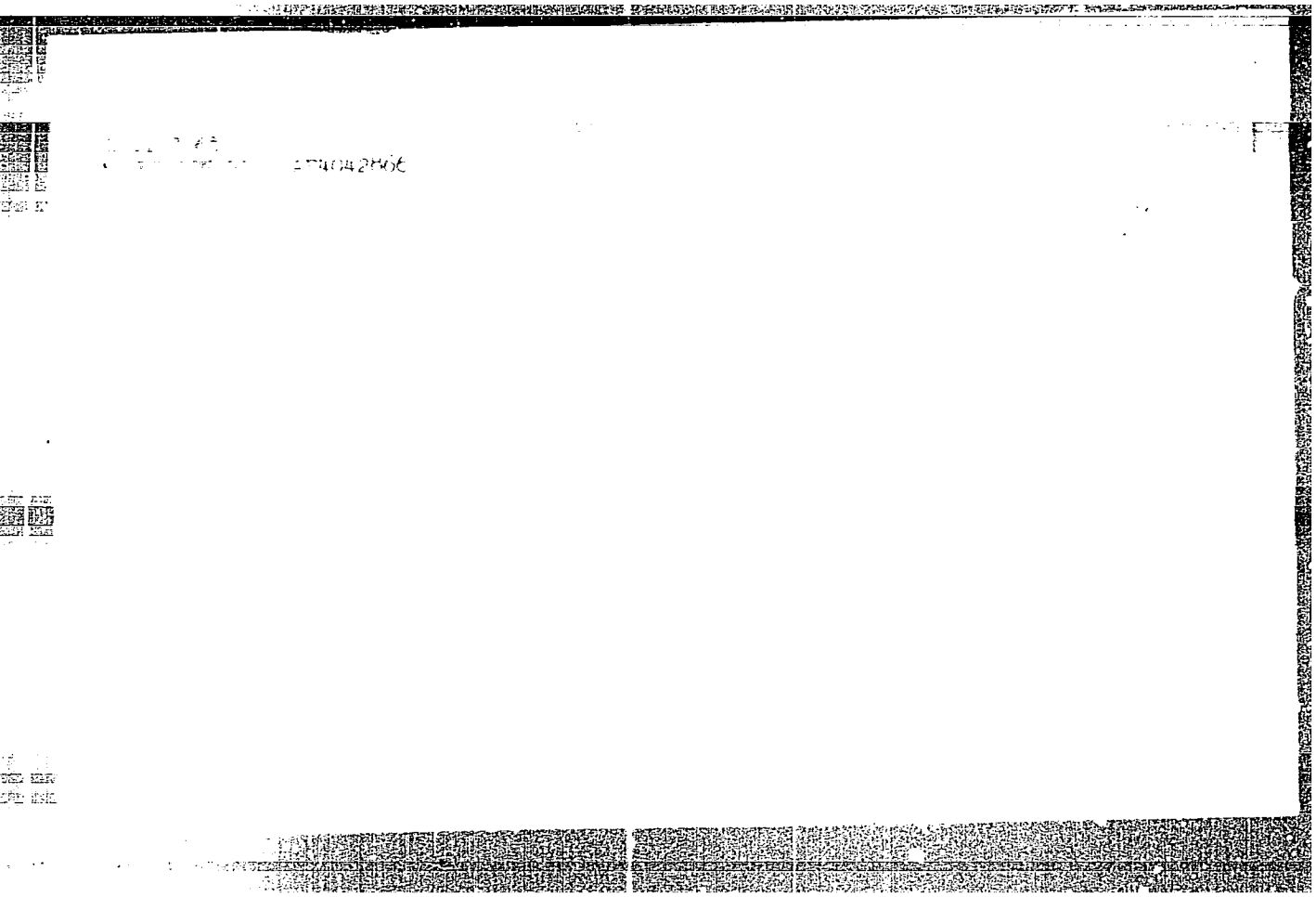
SUB CODE: GC, IC NR REF SOV: 006 OTHER: 011

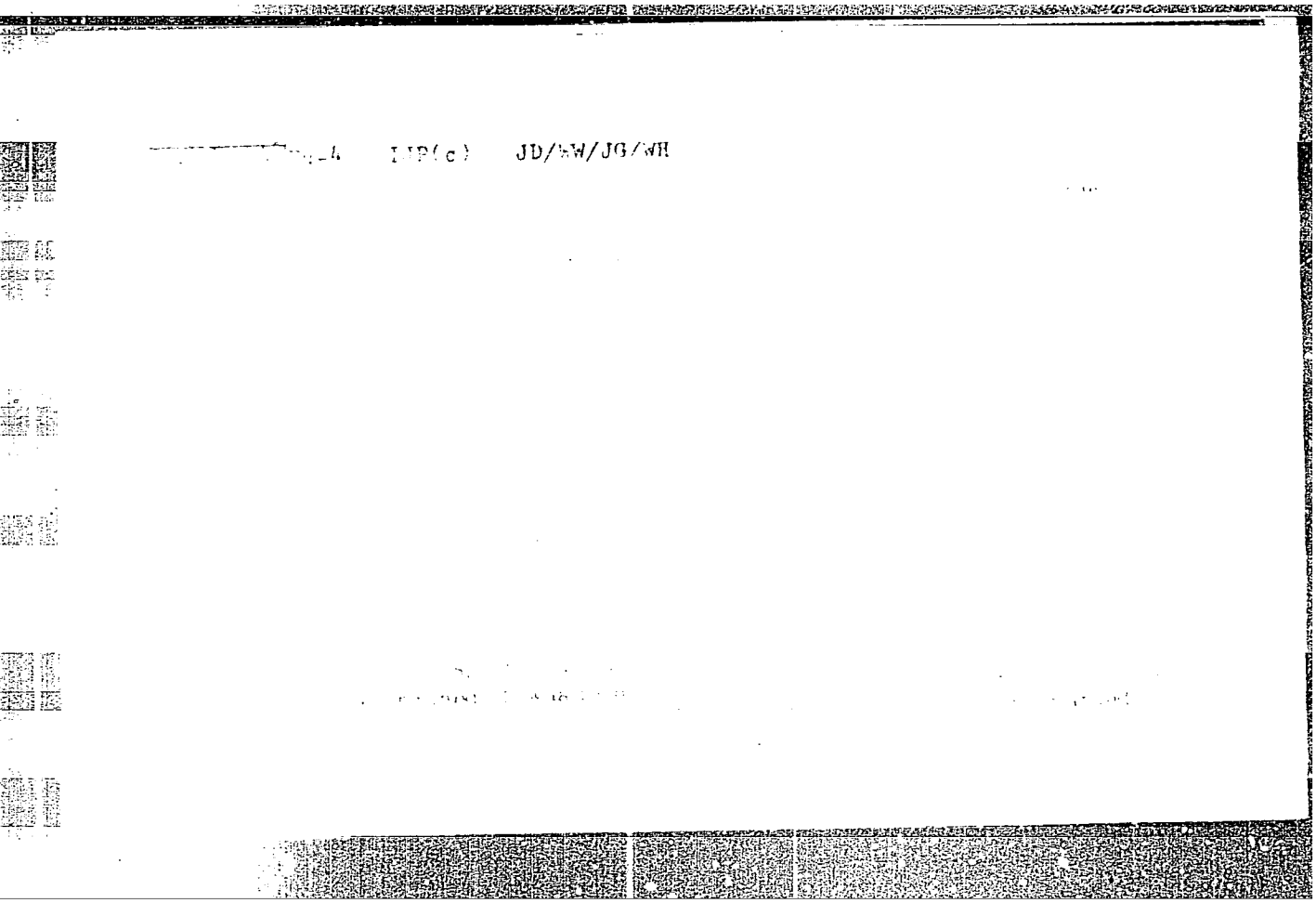
Card 2/2

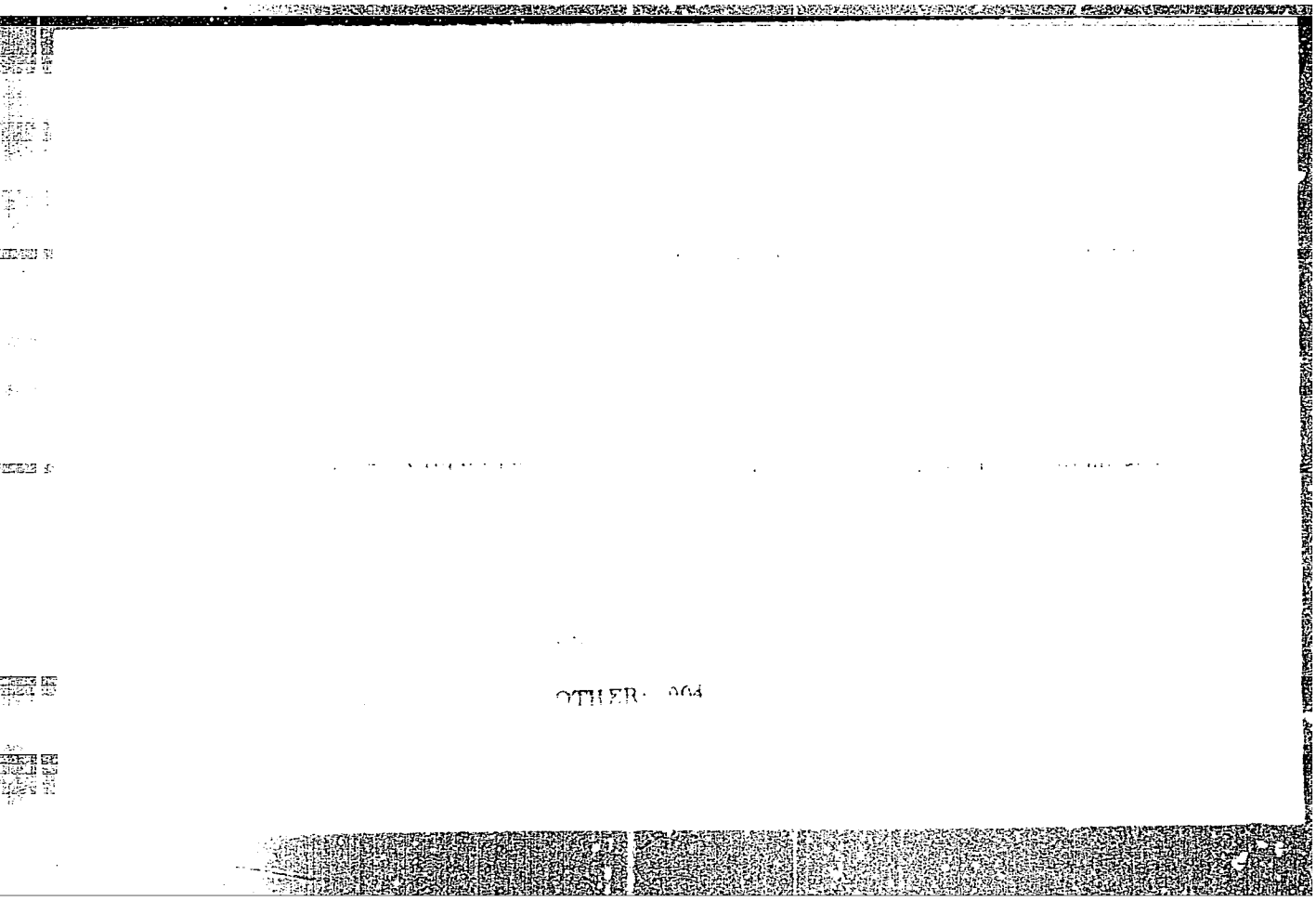
Fan, Fu-k'ang; Kuznetsov, A. K.; Keler, E. K.

[redacted] even during coprecipitation [redacted] heating

[redacted] with ZrO_2 under hydrogen [redacted] flame structure. This differed from the [redacted]







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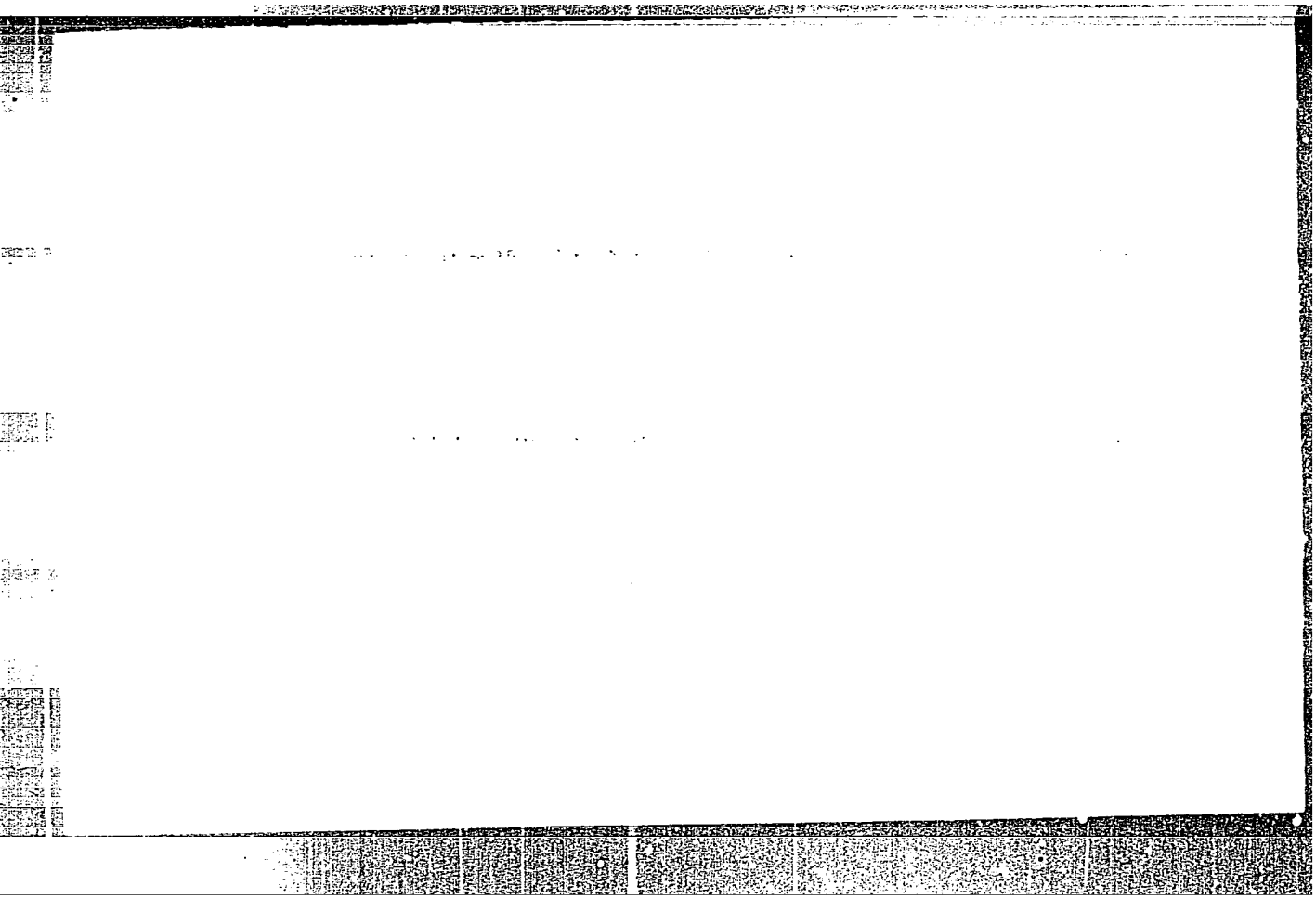
TOPIC TAGS: neodymium oxide water system, neodymium oxide hydrate stabili-



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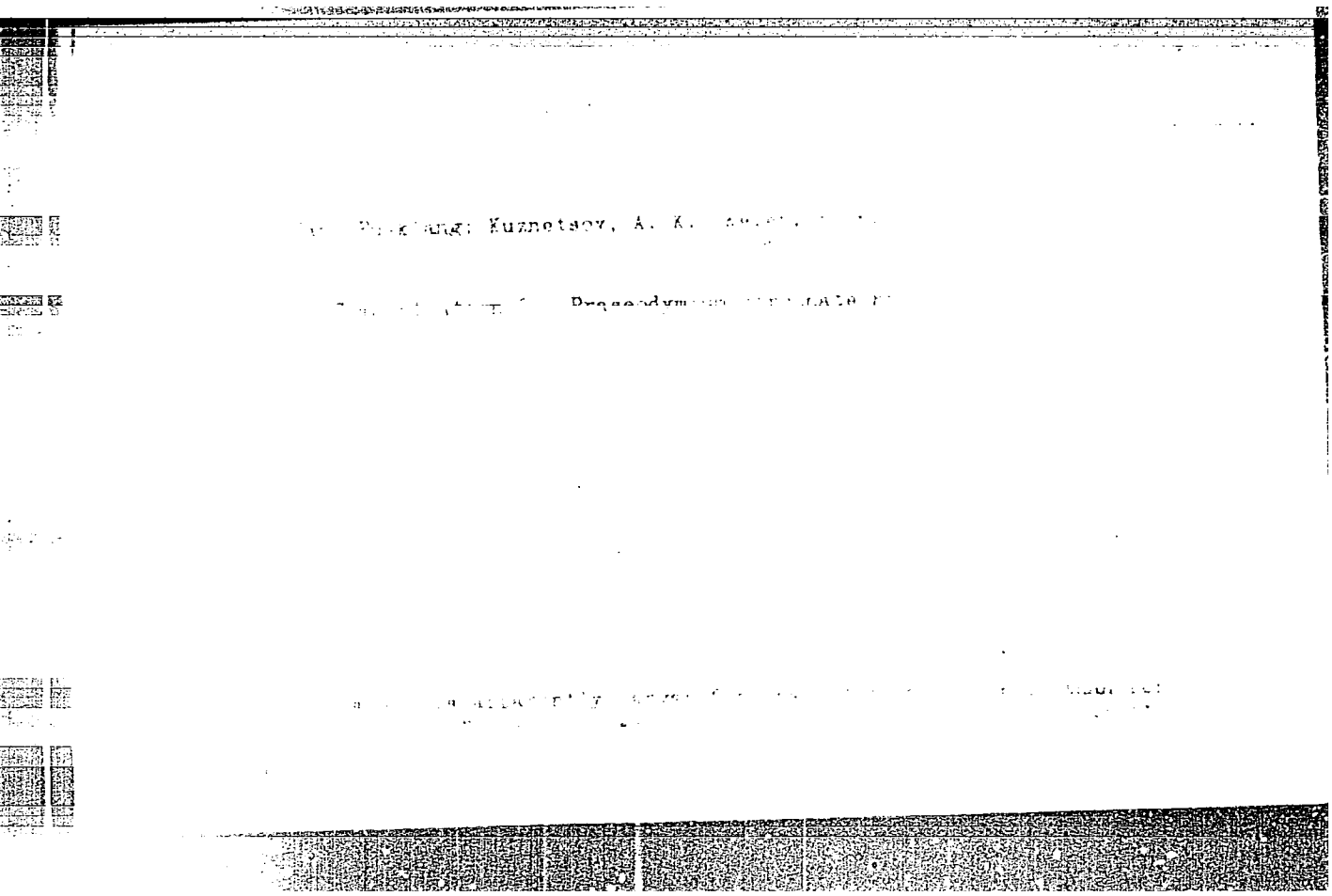
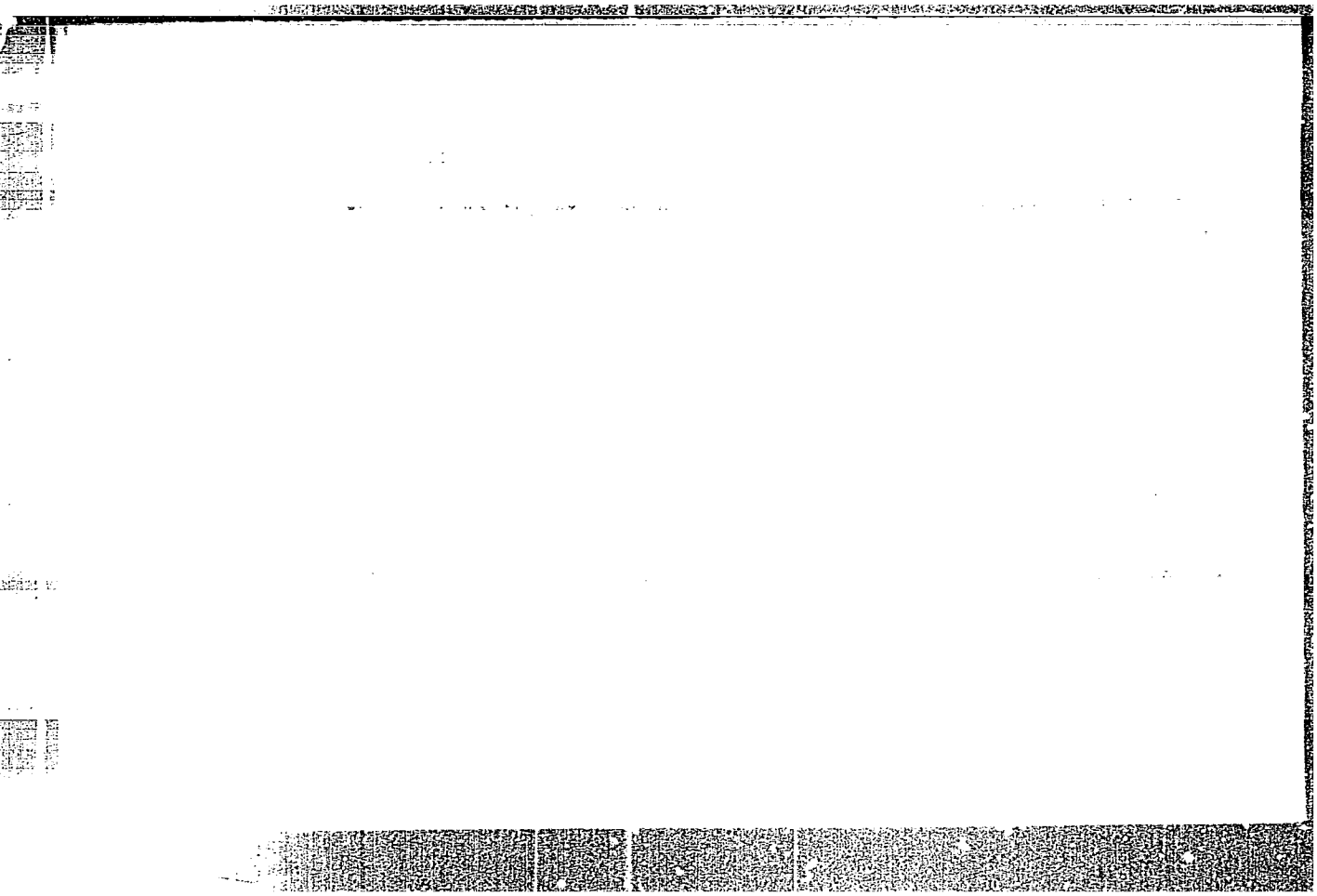
DYBAN', Yu.P., KEIER, E.K.

Effect of technological factors on the structure and properties of semiacid materials obtained. Izv. SO AN SSSR no.3 [illegible] '65. (MIRA 18:8)

1. Institut fiziko-khimicheskikh osnov pererabotki mineral'nogo syr'ya, Novosibirsk.





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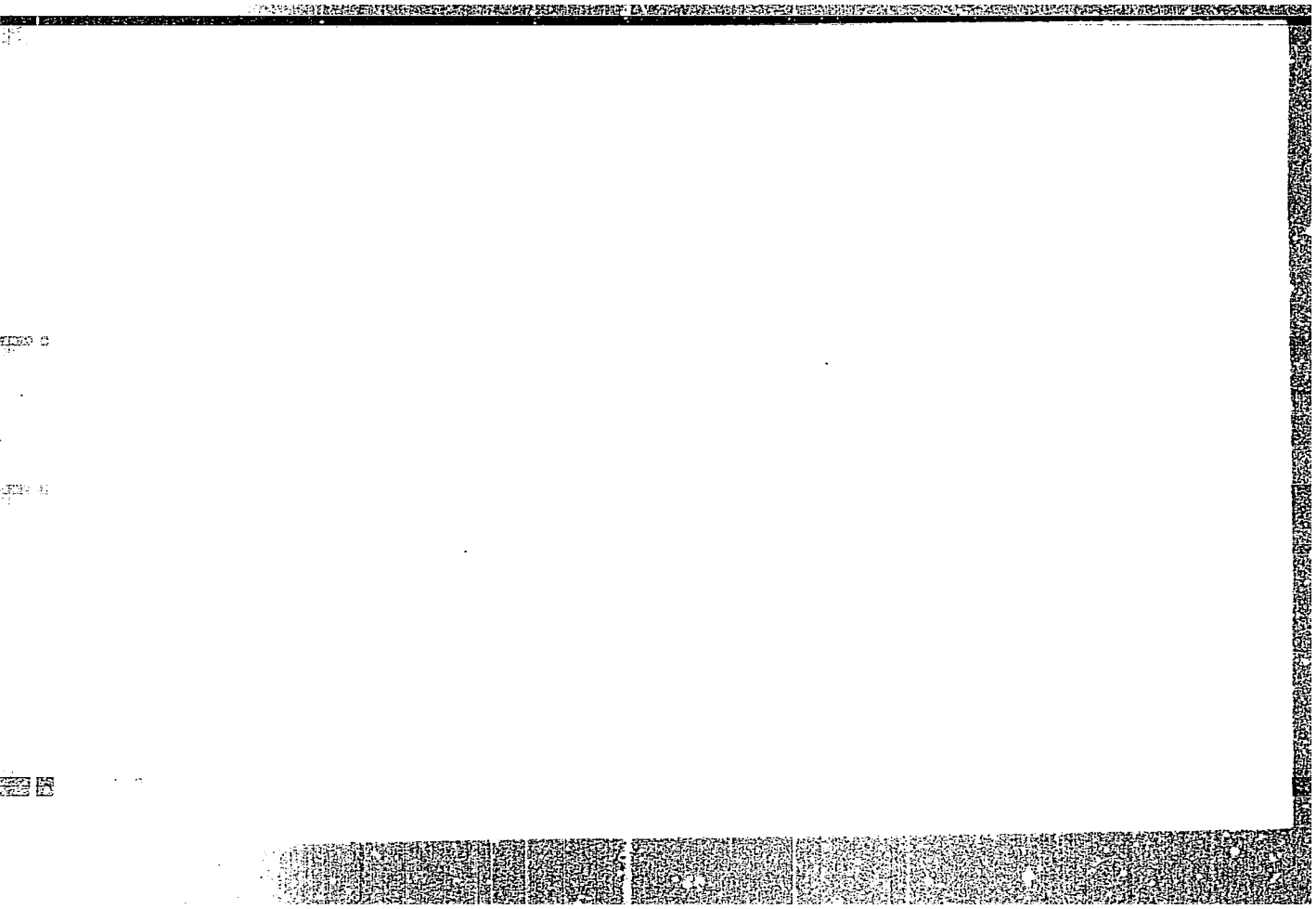

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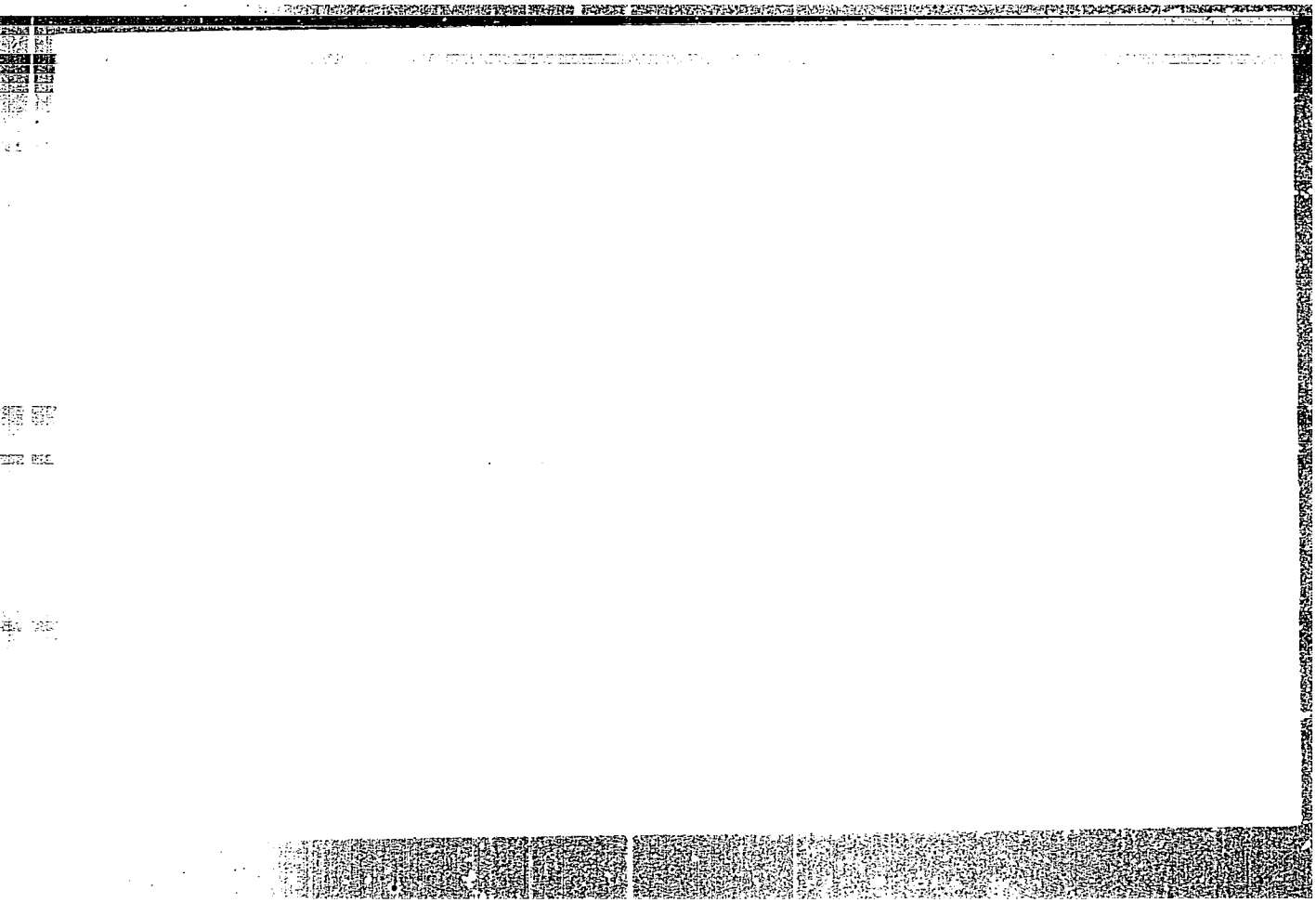


APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000721510006-9"

L 11003-66 EWT(m)/EWP(t)/EWP(b) LJP(c) JD

ACC NR: AP5029727 SOURCE CODE: UR/0363/65/001/011/1955/1964

AUTHOR: Glushkova, V. B.; Davtyan, I. A.; Keler, E. K.

ORG: Institute of Silicate Chemistry im. I. V. Grebenshchikov, Academy of Sciences SSSR (Institut khimii silikatov Akademii nauk SSSR)

TITLE: The Nd_2O_3-ZrO_2 system. Study of regions rich in neodymium oxide

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1, no. 11, 1965, 1955-1964

TOPIC TAGS: neodymium compound, zirconium compound, solid solution, metal phase system, metal chemical analysis, x ray analysis, phase transition, phase diagram, chemical stability, phase composition, crystal structure, inorganic oxide

ABSTRACT: Chemical and x-ray phase analyses were used to study the Nd_2O_3-ZrO_2 system, and a diagram of phase transitions was plotted for a region rich in Nd_2O_3. The stability of the cubic solid solution based on Nd_2O_3 was determined and the solution was shown to be stable only above 1500°C. It was found that the primary phase consists of cubic solid solutions when the mixtures are prepared by coprecipitating in the amorphous state followed by crystallization at 400-800°C or by decomposing a mixture of nitrates. As the composition of these metastable solid solutions changes monotonically, there is continuous change in their crystal structure from the Mn_2O_3-type--characteristic of the low-temperature C-form of Nd_2O_3 via the pyrochlore type--to the fluorite type in which the low-temperature form of ZrO_2 crystallizes. The

UDC: 546.657 + 546.831

Card 1/2

L 11003-66

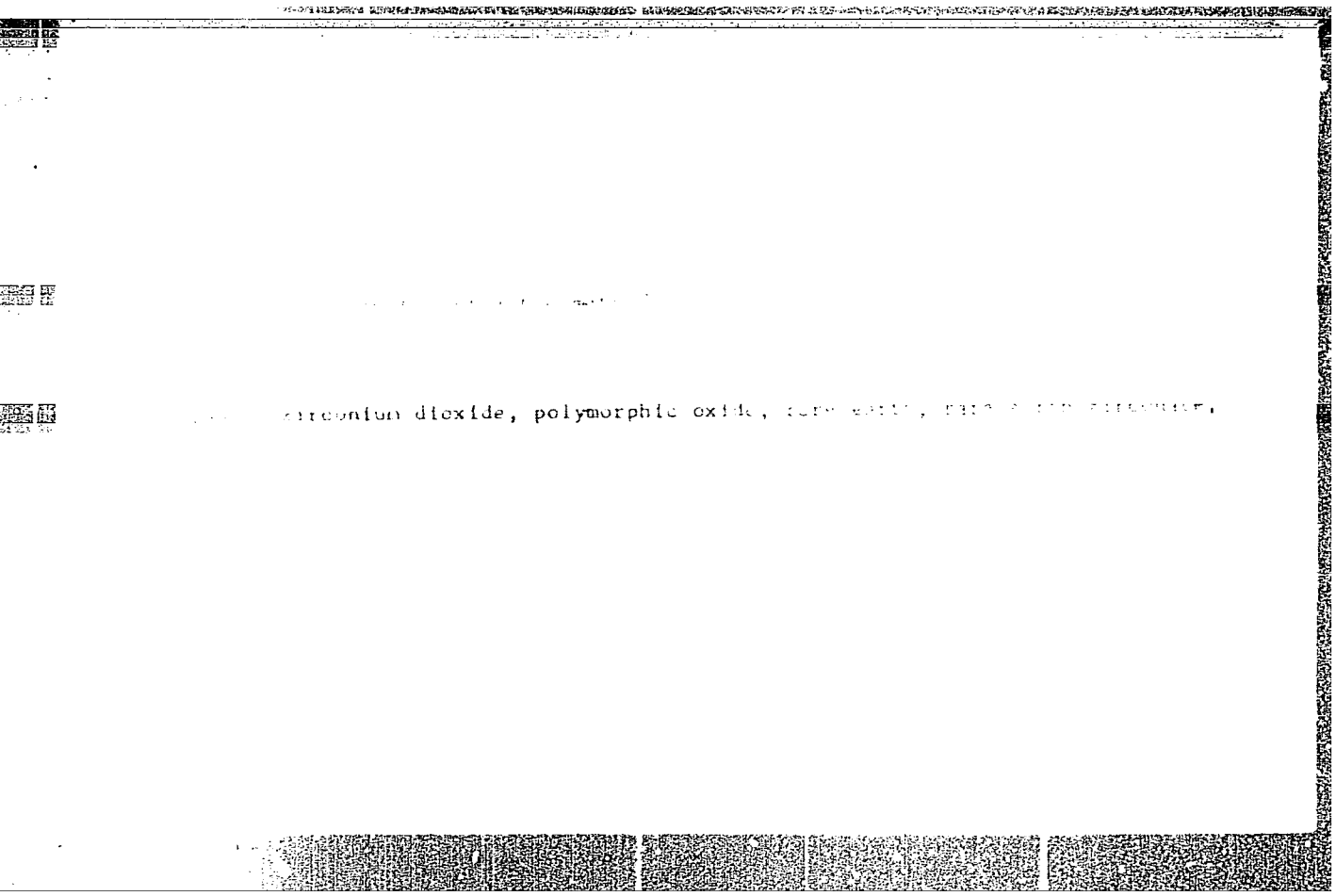
ACC NR: AP5028727

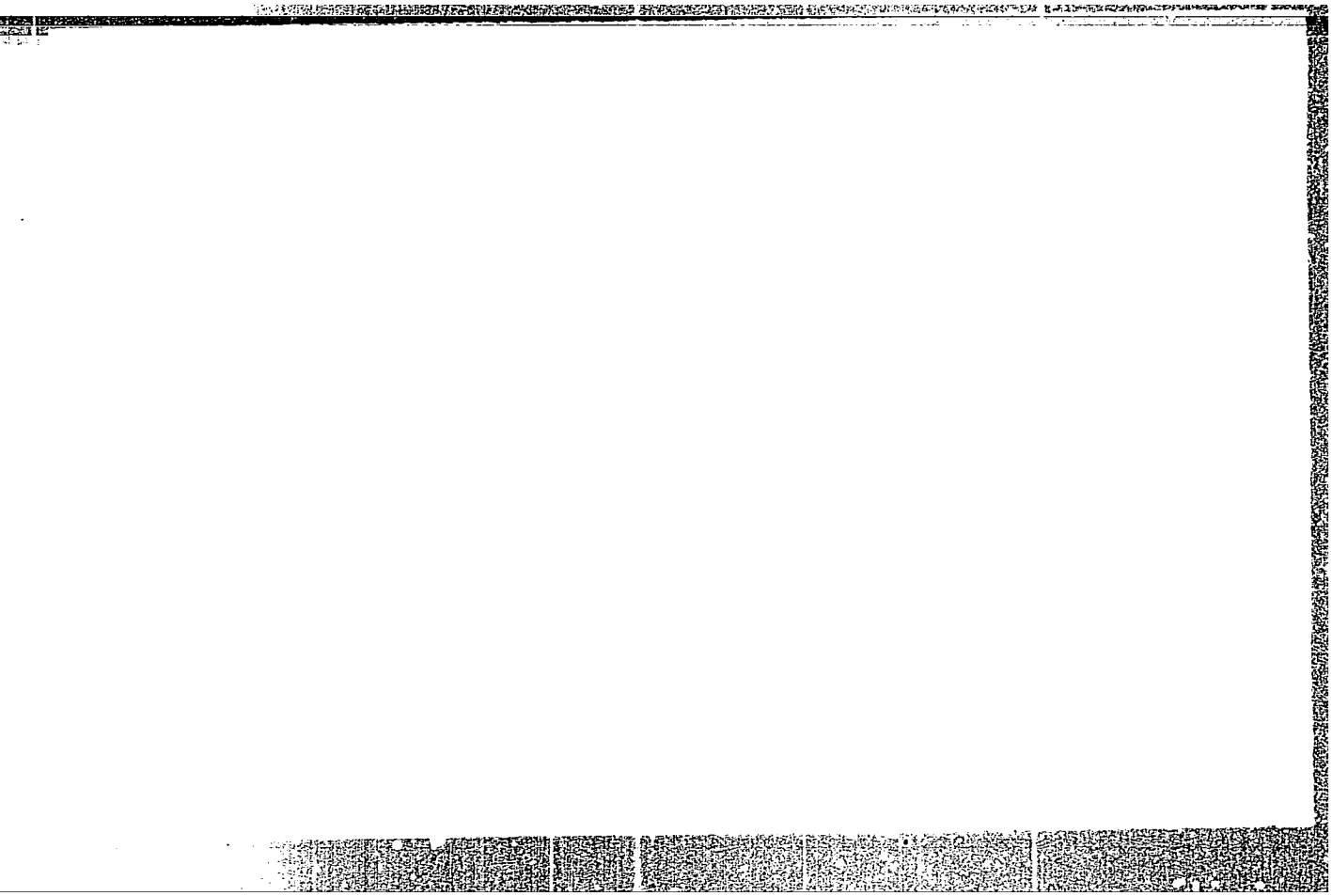
effect of the addition of ZrO_2 on the C-A transition of Nd_2O_3 was studied and it was shown that small amounts of ZrO_2 hinder the transition of the cubic solid solution (C-form) to the hexagonal (A). Where there is a high ZrO_2 content (10-20%) in the cubic solid solution, the intermediate product formed is a solid solution which crystallizes in a low symmetry (B-type). On heating to 1350-1400°C, the latter converts into an equilibrium mixture of solid solutions with hexagonal and pyrochlore structure. Orig. art. has: 5 figures, 3 tables.

SUB CODE: 07/ SUBM DATE: 24Apr65/ ORIG REF: 005/ OTH REF: 012

PC

Card 2/2





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L 10876-66 EWT(m)/EWP(t)/EWP(b) LJP(c) JD/JG

ACC NR: AP5025651 SOURCE CODE: UR/0080/65/038/010/2166/2174

AUTHOR: Andreyeva, A. B.; Keler, E. K.

ORG: none

TITLE: Reactions of lanthanum and neodymium oxides with elements of group II of the periodic table

SOURCE: Zhurnal prikladnoy khimii, v. 38, no. 10, 1965, 2166-2174

TOPIC TAGS: lanthanum oxide, neodymium compound, alkaline earth oxide, zinc oxide, cadmium compound, powder metal sintering, aluminate

ABSTRACT: Solid state reactions of La_2O_3 and Nd_2O_3 with BeO, MgO, CaO, SrO, BaO, ZnO, and CdO were studied in 1:2 powder mixtures. Mixtures containing Al_2O_3 in the proportion La_2O_3:RO:Al_2O_3 = 1:1:1 were also sintered. X-ray diffraction, thermographic, chemical phase and microscopic analyses were employed. No chemical compounds or solid solutions were found to form on heating up to 1500° in the two-component systems except in the case of BeO. Sintering of the Ln_2O_3-MeO mixtures occurs at 1400--1500°. When kept in air, the samples are unstable and crumble. In the three-component systems, no compounds are formed up to 1650°. The predominant reaction is the formation of lanthanum and neodymium aluminates; the secondary reaction is the formation of spinel-type compounds by the oxides of elements of group II. Spinel, $MgAl_2O_4$

UDC: 546.654'657+546.41.5+541.451

Card 1/2

L 10876-66

ACC NR: AP5025651

decomposes on heating to 1400-1500° in the presence of La_2O_3 and Nd_2O_3 to form rare earth aluminates. Recommendations are given for improving the porosity of Ln_2O_3-RO-Al_2O_3 mixtures. Orig. art. has: 3 figures, 5 tables.

SUB CODE: 07,11 SUBM DATE: 22Aug63/ ORIG REF: 002/ OTH REF: 009

Card 2/2

GOLUBINA, N.A.; KEYER, E.K.

Formation of lanthanum, praseodymium, and neodymium aluminates.
Izv.AN SSSR. Ser.khim. no.1:24-31 '66. (MIRA 19:1)

1. Institut khimii silikatov im. I.V.Grebenshchikova AN SSSR.
Submitted August 19, 1963.

L 16804-66 EWP(e)/EWT(m)/EPF(n)-2/EWP(t) IJP(c) JD/WW/JG/WH
ACC NR: AP6003371 (A) SOURCE CODE: UR/0363/66/002/001/0137/0144 33 31 13

AUTHOR: Leonov, A.I.; Andreyeva, A.B.; Keler, E.K.

ORG: Institute of Silicate Chemistry im. I.V. Grebenshchikov, Academy of Sciences SSSR (Institut khimii silikatov Akademii nauk SSSR)

TITLE: Effect of gaseous medium on the interaction between zirconium dioxide and cerium oxides 552 55,27 27

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 2, no. 1, 1966, 137-144

TOPIC TAGS: zirconium compound, cerium compound, solid solution

ABSTRACT: The phase relationships in the ZrO_2-Ce_2O_3 system were studied in a reducing atmosphere. The following characteristics were established: formation of the pyrochlore-type compound $Ce_2Zr_2O_7$, and three solid solutions based on zirconium dioxide - a monoclinic (below 1000C), tetragonal (above 1000C), and cubic solid solution (from 5 to 17 mole % Ce_2O_3), stable at high temperatures; a metastable solid solution based on Ce_2O_3 and a region of immiscibility between the indicated phases were also found. Dilatometric measurements established that in the concentration range from 0 to 27 mole % Ce_2O_3 there is a reversible polymorphic transformation of zirconium

Card 1/2 UDC: 546.831-31+546.655-31

2

dioxide with hysteresis at 900 – 1200C. At a Ce_2O_3 content in excess of 27 mole %, the polymorphism of ZrO_2 is completely suppressed. The effect of partial pressure of oxygen on the valence changes $Ce^{4+} \rightleftharpoons Ce^{3+}$ and on physicochemical properties of ZrO_2 was studied in the ZrO_2-CeO_2(Ce_2O_3) system. Cerium, which is in the form of CeO_2 in the solid solution in ZrO_2, converts into the trivalent state at high temperatures in a reducing atmosphere (H_2, CO, NH_3), in a vacuum (10^{-3} - 10^{-4} mm Hg), in an inert gas stream (Ar, He), and in the atmosphere of reverberatory furnaces with a low partial pressure of oxygen (p_{O_2} = 1.4 x 10^{-5} atm at 1400C). Alternate oxidation and reduction of cerium-containing zirconium refractories causes loosening and cracking of the material as a result of volume changes associated with the oxidation-reduction processes. Orig. art. has: 7 figures and 3 tables.

SUB CODE: 11,20 / SUBM DATE: 17Jun65 / ORIG REF: 013 / OTH REF: 016

L 24528-66 EWP(e)/EWT(m)/T JD/JG/WH

ACC NR: AP6011008 (A) SOURCE CODE: UR/0080/66/039/003/0489/0498

AUTHOR: Andreyeva, A. B.; Keler, E. K.

ORG: none

TITLE: Reactions of lanthanum and neodymium oxides with oxides of elements of groups III and IV of the periodic system

SOURCE: Zhurnal prikladnoy khimii, v. 39, no. 3, 1966, 489-498

TOPIC TAGS: lanthanum oxide, neodymium oxide, aluminum oxide, yttrium oxide, gallium compound, iron oxide, semiconducting ceramic material, chromium oxide, silicon dioxide, titanium dioxide, zirconium compound, cerium compound, tin compound

ABSTRACT: The reactions of La_2O_3 and Nd_2O_3 with certain oxides of tri- and tetravalent elements in the solid state were studied and the principal physicotechnical properties of the reaction products were determined. Pressed powder mixtures were prepared in which the molar ratio Ln:Me = 1:1 and 1:2, where Ln = La_2O_3 and Nd_2O_3, and Me = Al_2O_3, Ga_2O_3, Fe_2O_3, Cr_2O_3, Y_2O_3, SiO_2, TiO_2, ZrO_2, SnO_2, and CeO_2. The pressed pellets were then sintered at 1350, 1500, and 1700°C, and the products were

Card 1/2 UDC: 546.654'657 + 541.451

L 24528-66

ACC NR: AP6011008

2

examined by x-ray diffraction. La_2O_3 and Nd_2O_3 were found to form pyrochlore-type compounds with TiO_2, SnO_2, and ZrO_2; perovskite-type compounds with trivalent metal oxides Al_2O_3, Ga_2O_3, Cr_2O_3, and Fe_2O_3; and solid solutions in the region of Y_2O_3 and CeO_2 with the latter oxides. It was established that in La_2O_3- and Nd_2O_3-base compositions, no stability is imparted to the samples by SiO_2, TiO_2, ZrO_2, SnO_2, Y_2O_3, and CeO_2, taken in the proportion of 1:1 after firing at 1500°C. In compositions in which this proportion is 1:2 (except those containing TiO_2), fired up to 1400°C, ground up with a 1% admixture of mineralizer (B_2O_3 or ZnO), and refired at 1500°C, a good sintering was obtained, the reaction was complete, and the samples were stable both in air and during boiling in ammonium acetate and ammonium nitrate solutions. It is concluded that materials based on Ln_2O_3 and Nd_2O_3 can be used as special-purpose refractories (systems with ZrO_2, Cr_2O_3, Y_2O_3, Al_2O_3, SiO_2) with melting points at 2000°C and above and also as radio ceramics (systems with TiO_2, ZrO_2, Al_2O_3, Y_2O_3 and SnO_2) and semiconductors (systems with CeO_2, Cr_2O_3, ZrO_2, Fe_2O_3). Orig. art. has: 3 figures and 5 tables.

SUB CODE: 07/11/ SUBM DATE: 27Mar64/ ORIG REF: 008/ OTH REF: 014

Card 2/2 UCR

L 29606-66 EWT(m)/ETC(f)/T/EWP(e)/EWP(t)/ETI IJP(c) AT/WH/JH/JD/JG

ACC NR: AP6011322 (A) SOURCE CODE: UR/0363/66/002/003/0517/0523

AUTHOR: Leonov, A. I.; Andreyeva, A. B.; Shvayko-Shvaykovskiy, V. Ye.; Keler, E. K.

ORG: Institute of Silicate Chemistry im. I. V. Grebenshchikova, Academy of Sciences SSSR (Institut khimii silikatov Akademii nauk SSSR)

TITLE: High temperature chemistry of cerium in Al_2O_3, Cr_2O_3, Ga_2O_3 cerium oxide systems

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 2, no. 3, 1966, 517-523

TOPIC TAGS: cerium, aluminum, chromium, gallium, oxide, cerium compound

ABSTRACT: The effect of temperature (up to 2600°C) on structural properties of mixed oxide systems composed of CeO_2 and Al_2O_3, Cr_2O_3, or Ga_2O_3 was studied in air and hydrogen atmospheres. The phase relationships in the Ce_2O_3-Al_2O_3 system are shown in fig. 1. The phase relationships in Ce_2O_3-Cr_2O_3 systems are shown in fig. 2. It was found that CeO_2 does not form chemical compounds with oxides of Al, Cr, and Ga. Above 1650°C in air atmosphere, mixtures of oxides (e. g., Ce_2O_3-Al_2O_3, Ce_2O_3-Cr_2O_3, and Cl_2O_3-Ga_2O_3) form perovskite-type compounds ($CeAlO_3$, $CeCrO_3$, and $CeGaO_3$) admixed with the corresponding starting oxides. Pure $CeAlO_3$ and $CeCrO_3$ were obtained in a reducing atmosphere. Pure cerium gallite was synthesized by fusing a mixture of CeO_2 with Ga_2O_3 and

UDC: 546.655.3+546.763+546.683+546.623

Card 1/3

L 29606-66
ACC NR: AP6011322

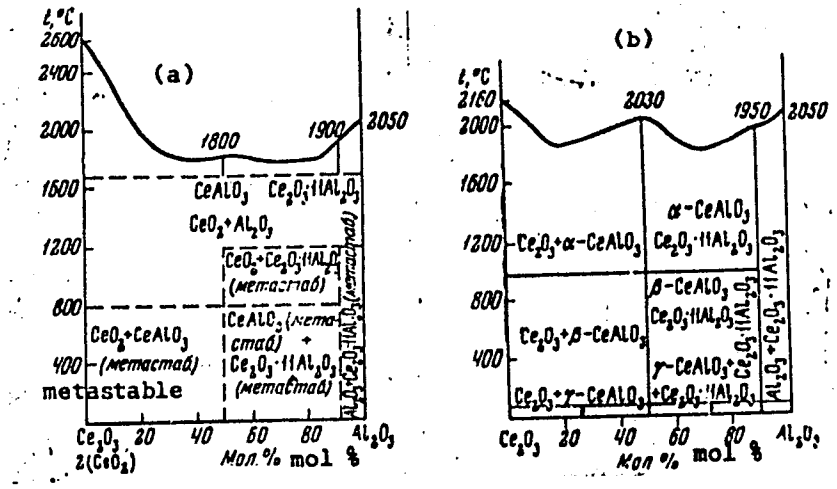

Fig. 1. a--in air; b--in hydrogen.

Card 2/3

L 29606-66

ACC NR: AP6011322

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metallic Ga in a sealed evacuated ampoule. $CeAlO_3$ and $Ce_2O_3 \cdot 11Al_2O_3$ form in the

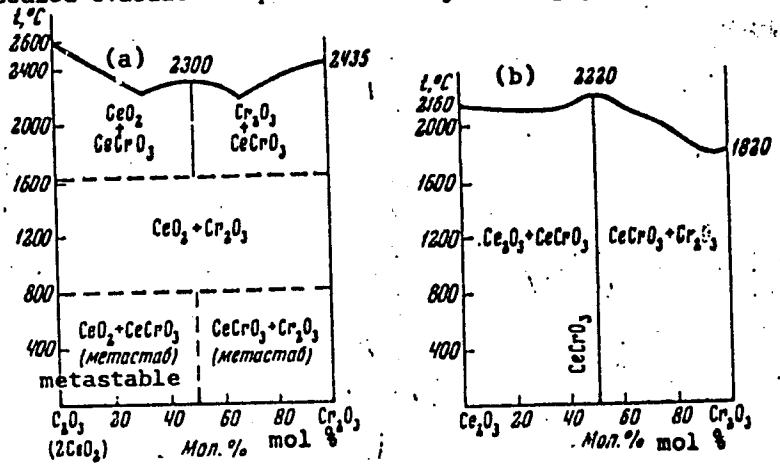

Fig. 2. a--air; b--hydrogen.

Ce_2O_3-Al_2O_3 system. Only one compound with a 1:1 ratio is formed in each of the Ce_2O_3-Cr_2O_3 and Ce_2O_3-Ga_2O_3 systems. Orig. art. has: 6 figures, 2 tables.

SUB CODE: 07/ SUBM DATE: 27Jun65/ ORIG REF: 007/ OTH REF: 005

Card 3/3 CC

L 30250-66 EWT(m)/T/EWP(w)/EWP(t)/ETI IJP(c) WW/JD/JG
ACC NR: AP6015073 (A) SOURCE CODE: UR/0363/66/002/005/0890/0895

47
B

AUTHOR: Davtyan, I. A.; Glushkova, V. B.; Keler, E. K.

ORG: Institute of Silicate Chemistry im. I. V. Grebenshchikov, Academy of Sciences SSSR (Institut khimii silikatov Akademii nauk SSSR)

TITLE: Effect of europium oxide admixtures on the polymorphism of zirconium dioxide

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 2, no. 5, 1966, 890-895

TOPIC TAGS: europium compound, zirconium compound, solid solution, phase transition, crystallization, thermal analysis, x ray analysis

ABSTRACT: The ZrO_2-Eu_2O_3 system was studied by using thermal and x-ray analysis. Addition of Eu_2O_3 was found to lower the temperature of the monoclinic-tetragonal transition of ZrO_2 considerably. Crystallization of mixtures of Eu_2O_3 and ZrO_2, coprecipitated in the amorphous state, forms metastable cubic solid solutions of europium oxide and zirconium dioxide. The crystallization temperature and lattice parameter of the cubic solid solution increase with rising Eu_2O_3 content. The decomposition of the metastable solid solution into stable phases was investigated. It was found that the minimum addition of europium oxide required for the complete stabilization of ZrO_2 is 7 mol % Eu_2O_3. It was shown that the addition of only 2% Eu_2O_3 eliminates the cracking of ZrO_2 during heating. A phase diagram was plotted for the phase transitions in the ZrO_2-Eu_2O_3 system for the region rich in zirconium dioxide (see fig. 1). Orig. art. has: 5 figures, 3 tables.

Card 1/2 UDC: 546.831.4+546.661

L 30250-66

ACC NR: AP6015073

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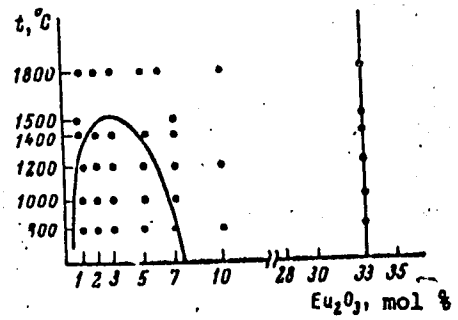

Fig. 1. Diagram of phase transitions in ZrO_2-Eu_2O_3 system for region rich in ZrO_2.

SUB CODE: 20,07/ SUBM DATE: 30Jul65/ ORIG REF: 002

Card 2/2 UC

L 36502-66 EWT(m)/EWP(e)/EWP(w)/T/EWP(t)/ETI IJP(c) AT/GS/JD/JG

ACC NR: AP6017873 (A) SOURCE CODE: UR/0062/66/000/005/0787/0792

AUTHOR: Leonov, A. I.; Piryutko, M. M.; Kolor, E. K.

ORG: Institute of Silicate Chemistry im. I. V. Grebenshchikov, Academy of Sciences, SSSR (Institut khimii silikatov Akademii nauk SSSR)

TITLE: Effect of gaseous medium and temperature on reactions in the system Ce - Ti - O and comparison of the properties of rare earth titanates

SOURCE: AN SSSR. Izvestiya. Seriya khimicheskaya, no. 5, 1966, 787-792

TOPIC TAGS: cerium compound, samarium compound, yttrium compound, titanium compound, titanate, lanthanum compound, neodymium compound, inorganic synthesis, physical chemistry property

ABSTRACT: The object of the study was to identify the chemical compounds formed in the binary mixtures In_2O_3 - TiO_2 (where In is a rare earth element) as a function of the conditions of synthesis (composition of the gas phase and temperature), and to determine the properties of these compounds. The synthesis was carried out in air, argon, carbon dioxide, hydrogen, and ammonia in the range of 20-1600°C. Phase x-ray diffraction analysis and thermogravimetric analysis on an electronic microbalance were employed. New compounds of the composition $CeO_{1.6} \cdot 2TiO_2$ (in argon and CO_2) and variable composition with a perovskite structure $(Ce_2O_3)_{1\pm x} \cdot 3TiO_2$ (in hydrogen and NH_3) were synthesized. Both compounds decompose on heating in air. The stability of cerium titanate of perovskite structure increases when it enters into a solid solution

Card 1/2 UDC: 546.65 + 546.821

L 36502-66

ACC NR: AP6017873

with calcium titanate. The solid solution can be synthesized in air. The effect of the gaseous medium on reactions in the systems La - Ti - O, Nd - Ti - O, Sm - Ti - O, and Y - Ti - O was clarified. In oxidizing and neutral gaseous media, lanthanum and neodymium form pyrochlore-type compounds $La_2(Nd_2)Ti_2O_7$, and in reducing media, perovskite-type compounds $(Ln_2O_3)_{1\pm x}\cdot 3TiO_{2-y}$. Samarium and yttrium form only pyrochlore-type compounds $Sm_2(Y_2)Ti_2O_7$, which are stable in both oxidizing and reducing gaseous media. Orig. art. has: 6 figures and 3 tables.

SUB CODE: 07/ SUBM DATE: 28Dec63/ ORIG REF: 002/ OTH REF: 003

Card 2/2 MLP

L 00651-67 EWT(m)/T/EWP(e)/EWP(t)/ETI IJP(c) AT/WH/JD/JG
ACC NR: AP6008498 (A) SOURCE CODE: UR/0062/66/000/001/0024/0031

AUTHOR: Godina, N. A.; Keler, E. K.

ORG: Institute of Silicate Chemistry im. I. V. Grebenshchikov, Academy of Sciences, SSSR (Institut khimii silikatov, Akademii nauk SSSR)

TITLE: Conditions for the formation of aluminates of lanthanum, praseodymium, and neodymium

SOURCE: AN SSSR. Izvestiya. Seriya khimicheskaya, no. 1, 1966, 24-31

TOPIC TAGS: oxide formation, aluminate, rare earth element, lanthanum, praseodymium, neodymium

ABSTRACT: This article is devoted to a study of the conditions for the formation of compounds in the La_2O_3-Al_2O_3, Pr_2O_3-Al_2O_3, and Nd_2O_3-Al_2O_3 systems, for which purpose the authors employ x-ray, thermal, and chemical phase analyses. The conditions of the formation of the aluminates are studied in the interaction of the oxides of lanthanum, praseodymium, and neodymium with α-alumina, aluminum nitrate, and during coprecipitation of solutions containing cations of lanthanides and of aluminum. The investigation revealed that two types of compounds, $Ln_2O_3 \cdot Al_2O_3$ and $Ln_2O_3 \cdot 11Al_2O_3$ are formed in the systems discussed. The compound $Nd_2O_3 \cdot 11Al_2O_3$ was obtained for the first time. The process of the formation of the compound $Ln_2O_3 \cdot 11Al_2O_3$ is stepwise. During the interaction of alumina oxides with rare-earth elements a monoaluminate is formed as an intermediate

Card 1/2 UDC: 539.26+541.11+542.928+546.65

L 00651-67

ACC NR: AP6008498

stage of the reaction which, upon a further increase of temperature, reacts with alumina with the formation of the compound $Ln_2O_3 \cdot 11Al_2O_3$. The production of monoaluminates from α-Al_2O_3 and from the oxides of rare-earth elements requires a temperature of 1600-1650C, whereas when aluminum nitrate is used synthesis is accomplished at 1200C. The x-ray amorphous gels formed upon coprecipitation of equimolar compositions which do not crystallize even up to a temperature of 800C are chemical compounds even at as low a temperature as 400C. The γ-form of Al_2O_3 which forms upon decomposition of the nitrate and hydroxide of aluminum is stabilized up to a temperature of 1300C in the presence of the oxides of rare-earth elements. Orig. art. has: 1 table and 7 figures.

SUB CODE: 07/ SUBM DATE: 19Aug63/ ORIG REF: 015/ OTH REF: 004

Card 2/2 pb

L 06297-67 EWP(e)/EWT(m)/EWP(e)/EWP(t)/ETI IJP(c) AT/WH/JD/JG/GD

ACC NR: AT6027155 (A) SOURCE CODE: UR/0000/65/000/000/0288/0293

AUTHOR: Andreyeva, A. B.; Keler, E. K.

ORG: none

TITLE: Synthesis and some properties of ceramic materials based on titanium dioxide and oxides of lanthanum, neodymium and yttrium

SOURCE: AN SSSR. Otdeleniye obshchey i tekhnicheskoy khimii. Issledovaniya v oblasti khimii silikatov i okislov (Studies in the field of chemistry of silicates and oxides). Moscow, Izd-vo Nauka, 1965, 288-293

TOPIC TAGS: titanium dioxide, ceramic material, lanthanum oxide, neodymium compound, yttrium compound

ABSTRACT: The paper constitutes a part of a cycle of studies aimed at ascertaining the value of rare earth oxides in the preparation of ceramic materials, and considers the effect of various rare earths in titanium-containing compositions. The mixtures studied were prepared in the proportions $La_2O_3:TiO_2$, $Nd_2O_3:TiO_2$, $Y_2O_3:TiO_2$ = 1:1 and 1:2, ground, pressed, and sintered. They were found to sinter at 1350°C, but to have a very narrow sintering range and to fuse at 1400°C. A study of the kinetics of the reaction of La_2O_3 and Nd_2O_3 with titanium oxide showed that after 2 to 3 hr at 1300° and 1/2 hr at 1400° the reaction nearly reaches completion. In order to obtain materials with a porosity close to zero, measurements of the electric properties, resistiv-

Card 1/2

L 06297-67

ACC NR: AT6027155

ity, elastic, acoustic and certain other properties were made which showed the presence of materials having valuable physical and technical characteristics in the systems studied. Orig. art. has: 3 figures and 3 tables.

SUB CODE: 11/ SUBM DATE: 10Oct63/ ORIG REF: 001/ OTH REF: 004

Card 2/2

L 06488-67 EWT(m)/EWP(e) WH

ACC NR: AP6028300 SOURCE CODE: UR/0363/66/002/006/1047/1054

AUTHOR: Leonov, A. I.; Keler, E. K.; Andreyeva, A. B. 36 15

ORG: Institute of Silicate Chemistry im. I. V. Grebenshchikov, Academy of Sciences, SSSR (Institut khimii silikatov Akademii nauk SSSR)

TITLE: Status of research on the systems La_2O_3-ZrO_2, Ce_2O_3-ZrO_2 and Nd_2O_3-ZrO_2

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 2, no. 6, 1966, 1047-1054

TOPIC TAGS: lanthanum compound, cerium compound, zirconate, titanate, silicate, aluminate, refractory, oxide ceramic, chromium compound

ABSTRACT: Phase relationships in the systems La_2O_3-ZrO_2, Ce_2O_3-ZrO_2 and Nd_2O_3-ZrO_2 are discussed on the basis of phase diagrams and x-ray and chemical data reported in the literature. A study of the stability and oxidation resistance of the compounds $Ce_2Zr_2O_7$, $Ce_2Ti_3O_{8.4}$, $Ce_2Si_2O_7$, $CeCrO_3$ and $CeAlO_3$ at high temperatures showed that cerium zirconate is the least stable compound. Literature data on phase relationships in ceramic systems of the type Ln_2O_3-ZrO_2 indicate that the current methods of studying oxide ceramics (x-ray diffraction, microscopy, chemical phase analysis) are inadequate because they yield averaged characteristics of the structure and composition of matter. Future development of studies of zirconium refractories should involve the study of the actual structure and composition in microvolumes by methods of microauto-

Card 1/2 UDC: 666.3

L 06482-67
ACC NR: AP6028300

radiography and x-ray spectroscopy. Orig. art. has: 6 figures and 1 table.

SUB CODE: 07,11/SUBM DATE: 27Jul65/ ORIG REF: 007/ OTH REF: 012

Card 2/2 mfe

ACC NR: AP6021571 (A) SOURCE CODE: UR/0131/66/000/003/0042/0048

AUTHOR: Leonov, A. I., Keler, E. K.; Andreyeva, A. B.

ORG: Institute of Silicate Chemistry im. I. V. Grebenshchikov, AN SSSR (Institut khimii silikatov. AN SSSR)

TITLE: Effect of a gaseous medium on chemical reactions and polymorphic transformations in the system zirconium dioxide-cerium oxides

SOURCE: Ogneupory, no. 3, 1966, 42-48

TOPIC TAGS: cerium compound, zirconium compound, gas, oxygen, refractory compound, CHEMICAL VALENCE, CHEMICAL STABILIZER

ABSTRACT: The effect of partial pressure of oxygen on valency changes of Ce in the system ZrO_2-Ce oxides and on the physico-chemical properties of refractories in this system is investigated. CeO_2 is the most effective stabilizer of ZrO_2. In the system ZrO_2-CeO_2 solid solutions of three types take form --monoclinic, tetragonal and cubic. CeO_2, which is present in the solid solution in ZrO_2, changes to trivalent state at high temperatures in a reducing atmosphere (H_2, CO, NH_3), in a flow of inert gases (Ar, Ne) and in flame-furnace atmospheres

 UDC: 546.831:666.76

ACC NR: AP6021571

with a low partial pressure of oxygen ($p_{O_2} = 1.4 \cdot 10^{-5}$ atm at 1400° C) and in a vacuum 10^{-3}-10^{-4} mm Hg). Tetravalent cerium Ce^{4+} (r = 0.88 Å) is a more effective stabilizer of ZrO_2 than trivalent cerium Ce^{3+} (r = 1.02 Å). Cyclic oxidation and reduction of Ce-containing Zr refractories, leading to the reversible reaction $Ce^{3+} \rightleftarrows Ce^{4+}$, cause the loosening and cracking of the material owing to the volume changes which accompany redox processes. By contrast, specimens heated in an inert gas (argon) remained unchanged. Thus, the gaseous phase affects greatly the properties of the refractories made of ZrO_2 stabilized with CeO_2. Orig. art. has: 9 figures, 2 tables.

SUB CODE: 13, 11/ SUBM DATE: none/ ORIG REF: 007/ OTH REF: 014

ACC NR: AP6031942 SOURCE CODE: UR/0080/66/039/009/1913/1920

AUTHOR: Savchenko, Ye. P.; Godina, N. A.; Keler, E. K.

ORG: Institute of the Chemistry of Silicates, AN SSSR (Institut khimii silikatov AN SSSR)

TITLE: Solid state reactions of niobium pentoxide with lanthanum, cerium, and praseodymium oxides

SOURCE: Zhurnal prikladnoy khimii, v. 39, no. 9, 1966, 1913-1920

TOPIC TAGS: solid state reaction, cerium oxide, lanthanum oxide, praseodymium oxide, niobium pentoxide, niobate, chemical reaction kinetics, ceramic material, NIOBIUM COMPOUND

ABSTRACT: The purpose of the study was to determine the nature, conditions of formation, and properties of the compounds in the Ln_2O_3-Nb_2O_5 systems, where Ln = La, Ce, or Pr. The study is of interest for production technology of ceramic materials based on the rare-earth metal niobates. Formation of the niobates of three types: Ln_3NbO_7, $LnNbO_4$, and $LnNb_3O_9$ was ascertained in the products of solid state reactions, in the 900—1650C range, between Nb_2O_5 and La_2O_3, Pr_6O_{11}, or CeO_2. The effects were determined of the composition of the starting mixture of pure oxides, reaction temperature and duration on composition of the products, using x-ray, chemical, and differential thermal analysis for identification of the phases in the product. A stepwise formation of niobates was established in all three systems in the sequence: Ln_3NbO_7-$LnNbO_4$-$LnNb_3O_9$. X-ray analysis showed that La, Pr, and Ce niobates of each type are isostructural. Interplanar spacings, density, and melting point were determined for each of the pure niobates prepared. Metaniobates $LnNb_3O_9$ melted incongruently yielding orthoniobates, $LnNbO_4$, and a liquid. Reactivity of CeO_2 versus Nb_2O_5 was lower than that of La_2O_3 and Pr_6O_{11} versus Nb_2O_5, but it was higher than versus SiO_2 and Al_2O_3. Cerium niobates are more stable in air than silicates and aluminates. Orig. art. has: 3 tables and 6 figures. [JK]

SUB CODE: 07/ SUBM DATE: 12Jul64/ ORIG REF: 011/ OTH REF: 003/ ATD PRESS: 5084

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ACC NR: AP7003299 (A) SOURCE CODE: UR/0062/66/000/012/2073/2079

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TITLE: Rare earth zirconates and their physicochemical properties. Report No. 3: Some regularities of formation and physicochemical and technical properties of zirconates

SOURCE: AN SSSR. Izvestiya. Seriya khimicheskaya, no. 12, 1966, 2073-2079

TOPIC TAGS: zirconate, rare earth compound, physical chemistry property

ABSTRACT: The object of the study was to briefly expose certain regularities in the formation of rare earth zirconates and to compare their physicochemical and technical properties with the ionic radius and atomic number of the rare earth element in the periodic system. Complex, thermal, x-ray structural, chemical and microstructural analyses were employed. The mechanism of formation of the zirconates on coprecipitation from salt solutions is the same for all the rare earth oxides studied. The height of the peaks of the first exothermic effect due to crystallization of the rare earth zirconate from the amorphous coprecipitation product decreases in the series $La_2O_3 \rightarrow (CeO_2) \rightarrow Pr_2O_3 \rightarrow Nd_2O_3 \rightarrow Sm_2O_3 \rightarrow Y_2O_3$, Yb_2O_3. This corresponds to a decrease in the reactivity of these oxides as compared to zirconium dioxide. The latter apparently forms the compounds $In_2Zr_2O_7$ (where In is a rare earth element) having the pyro-

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chlore structure with all the oxides of trivalent rare earth elements. With the exception of $Ce_2Zr_2O_7$, the zirconates studied are stable on heating in air. The physicochemical properties of rare earth zirconates (lattice parameter, x-ray density, specific gravity, refractive index and melting point) are closely related to the atomic number and the ionic radius of the rare earth element. Orig. art. has: 6 figures and 1 table.

SUB CODE: 07/ SUBM DATE: 02Jul64/ ORIG REF: 002/ OTH REF: 008

Card 2/2

ACC NR: AP6036791 (A) SOURCE CODE: UR/0363/66/002/011/1998/2002

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TITLE: Effect of additions of germanium dioxide and yttrium and neodymium germanates on the polymorphism of zirconium dioxide

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 2, no. 11, 1966, 1998-2002

TOPIC TAGS: zirconium compound, germanium compound, yttrium compound, neodymium compound, phase transition

ABSTRACT: The article considers the following questions: 1) the formation of solid solutions based on ZrO_2 with additions of GeO_2; 2) the stability of these solid solutions and the volatility of GeO_2 from them; and, 3) the effect of the amount of the additions of germanium dioxide in a solid solution at the temperature of the monoclinic-tetragonal transition of ZrO_2, and the possibility of the tetragonal form of ZrO_2. Solid solutions of zirconium with additions of 2, 5, 10, 15, and 20 mole % GeO_2 were prepared by the method of coprecipitation. In all the mixtures there was observed an exothermic effect of crystallization, and at the same time the crystallization

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temperature of the product increased with an increase in the amount of additive. X ray analysis of the products indicated that additions of GeO_2 stabilize the tetragonal form of ZrO_2 only up to a temperature of 1200°C. Therefore, further experiments were undertaken with additions of GeO_2 plus oxides of rare earth elements (since oxides of the rare earth elements stabilize ZrO_2 at high temperatures). Ternary mixtures of the following composition were prepared (wt.%):

ZrO_2	96	90	96	90	96,7	91,7
GeO_2	2	5	2	5	2	5
Y_2O_3	2	5	-	-	-	-
Nd_2O_3	-	-	2	5	1,3	3,3

It was found that stabilization of zirconium dioxide with yttrium germanates makes it possible to increase the stability of the solid solutions at high temperatures. Orig. art. has: 5 figures.

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